No. 4

THE

REGISTER OF ARTS,

AND

JOURNAL OF PATENT INVENTIONS.

VOLUME SEVENTH.

NEW SERIES.

EDITED BY L. HEBERT,

CIVIL ENGINEER.

London:

PUBLISHED BY B. STEILL,

20, PATERNOSTER ROW;

AND SOLD BY ALL BOOKSELLERS.

1832.

INDEX.

INDEX.

END OF VOL. VII. NEW SEKIES.

DIRECTIONS TO THE BINDER.

Coe, Printer, 27, Old Change, St. Pauls'.

THE

REGISTER OF ARTS,

AND

JOURNAL OF PATENT INVENTIONS.

PATENTS ENROLLED BETWEEN 10TH DECEMBER, AND 10TH JANUARY, 1832.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

BEDSTEADS.—To Sarah Guppy, of Tarway House, Clifton, near Bristol, Widow, a patent for "a method of applying and arranging certain articles, parts, or pieces of cabinet work, upholstery, and other articles, frequently applied to bedsteads, and hangings, and also others not hitherto so applied," was granted on the 27th of October, 1831, and the specification was deposited in the Enrolment Office on the 26th of December, 1831.

The subject of the foregoing apparently whimsical title, is a bedstead; and of course intended to be, an improved one; a quality we might have been disposed to question, had the invention not emanated from a lady; but the authority of the fair sex cannot and ought not to be disputed in such matters.

Before we proceed to explain, in detail, all the ingenious arrangements, we will endeavour to unravel the mystery of the title, by acquainting the reader that the "method of applying and arranging certain articles" seems to relate to a series of *drawers* which are fixed underneath the bed and form the ground-work of the stead, the bed-posts being fixed thereon. There are four drawers, in two tiers of two drawers each, placed on one side of

the bed; if the bed be narrow there are to be no drawers on the other side, but only the back of the former; but should the bed be of the full width, then there are similar sets of drawers on the opposite side. These drawers have sliding covers to them, and being partly drawn out, at different extents, form steps to get into or out of bed; when it is necessary to have access to the interior of the drawers, the covers are pushed back; and when the drawers are shut up, the covers slide over them again by coming in contact with the back of the drawers. Now immediately over these useful "articles of cabinet work," is a platform or floor, the whole area of the bedstead, for the reception of such dust or flue as may collect thereon; and at about eight inches above this, are the side and end rails which form the frame for the usual sacken or laths. This frame is supported upon four short corner posts, and it is connected at the angles, not in the usual manner by screws passing through the posts, but the ends of each rail is notched half through on opposite sides, so as to form common flush joints; they are fastened together by long metallic rods, one of which passes longitudinally throughout the centre of each post, and this connects five pieces of which each post consists, each of the ends of the rods being provided with nuts and screws for drawing them up tightly. The frame of the tester is joined to the posts in the same manner as the side rails before described, and valances are attached thereto by a series of lines and pulleys adapted to open and close them, and thus regulate the ventilation. The *curtains* are suspended upon rods fixed to the posts by hooks, at nearly a foot below the tester.

But the most curious novelty in this bedstead, consists in the certain "hangings not hitherto so applied," which is a ribbon passing through two pulleys fixed in a stout transvere rail over the tester, the two ends of which depending near to the person lying in bed, are provided with handles; and these, the fair patentee tells us, are to be laid hold of and pulled alternately, "for the purpose of taking exercise in bed!" Now although our prejudices had led us to suppose, that people went to bed to take rest, the new light shed upon us by the patentee makes us regard this exercising bed as a most benevolent invention; and the patent is unquestionably good in law, since it is obviously calculated to be of "*great public utility.*" Our sea-faring readers will, we are sure, be delighted with it, as it will enable them to "haul close to the wind," whether on the starboard or larboard quarter; "luff round, raise tacks and sheets," and "keep upon an even keel."

We anticipate no less satisfaction from those who live on dry land, especially after the patentee's talents have been directed to the full development of her ideas on this interesting subject: and although we could suggest various improvements, we shall be content with merely naming two or three, being fully persuaded that it would be "carrying coals to Newcastle" to do more. As the chief objects of the inventress are "to take exercise in bed," and to ventilate the same, we think it is most essential she should provide for weak persons the means of doing so. If the bottom of the bed were therefore made of just sufficient elasticity to be pressed down by the weight of the person on it, very slight pulls upon the aforesaid ribbons, would produce very great motions, which might be accelerated or retarded with facility, at pleasure; besides causing a considerable ventilation. If again the bedstead were wholly suspended to a central point in the ceiling above, and the ribbons were connected to a crank movement, the alternating would be converted into a rotary motion, and the bed might then be spun round with any required velocity, thereby producing a powerful tendency to sleep, as well as a very refreshing air in the chamber. And we would submit to the faculty, that this rotary motion may be made to effect a perfect cure in cases of vertigo. As in that disease the patient imagines his head to be turning round in a certain direction, it would only be necessary to give the bed an opposite rotation, and it is evident that if both move with an equal velocity, a dead stop must be the result, leaving the patient perfectly well.

We could point out other important advantages which will attend the adoption of this improved bedstead if we had space, but we have only room left for the explanation of the perspective sketch we have given at Plate I. fig. 1, where *a a* shows two drawers shut up under the bedstead; *b c* two similar drawers shown as partly open when used as bed steps; *d* and *e* sliding covers to the drawers, that at *e* being represented as partly open to have access to the inside; *f* platform for the reception of dust and flue; *g g g g* the four rails of the sacking frame, jointed at the angles in the manner already described, resting on the short parts *h h h h* fixed to *f*; *i i i i* the bed-posts formed of separate pieces as before mentioned, and fastened together by a metallic rod passing through them screwed up at the ends by nuts, as shown by dotted lines; *j j j j* four rods to which the curtains are hung; the ends of the rods are bent down at right angles, the vertical extremities entering apertures in the posts made where the pieces

divide at *k k k k*; *l l l l* is the tester, and *m m* an ornamental top; to the tester is connected the apparatus, before mentioned, for manœuvring the valences, not put in the drawing; *n* the transverse bar carrying two pulleys *o*, and the exercising ribbons *p p*.

STILLS.—To William Godfrey Kneller, of Hackney, in the county of Middlesex, Esq. a patent for "improvements in stills, or apparatus for distilling," was granted on the 29th of June, 1831, and the specification was deposited in the Enrolment Office on the 29th of December, 1831.

This invention consists in the application of a congeries of concentric cylinders, containing suitable fluids, for repeatedly washing and rectifying the vapours of the fermented liquor as they proceed from an ordinary still, prior to their entering the worm or final condenser. Such apparatus may either form a distinct appendage to a common still, or, it may be included in the neck or head of one, which must be rendered more capacious for the purpose. The mechanical arrangement is original, simple, and ingenious, and we doubt not will be clearly understood on reference to figs. 2 and 3, Pl. I, and the subjoined explanation.

Fig. 2. affords an elevation of the patent still; *a a* the boiler, set in brick-work; *b* the furnace; *c* a guage to ascertain the height of wash in the still; *d* a pipe and cock, for discharging the contents of the still: at *e f g h* is the patentee's improvement, which is a cylindrical vessel, flanged and rivetted to the boiler at *g h*, and to the neck at *e f*: a section of this part of the machine, on an enlarged scale, is represented at fig. 3, wherein similar letters have reference to corresponding parts in fig. 2. *e f g h* thus forms the outer cylinder of the purifying vessels, connected as before-mentioned; *i k l m n* are five concentric cylinders, open at the top, where they are joined by flanges, which successively increase in their widths as the capacities of the cylinders diminish, in order that they may all be united together externally at *e f* by long rivets passing through the whole; these cylinders have bottoms, and are filled with water, or some mixture adapted to the subject under preparation, to the height shown in the drawings, by pouring it through an opening (provided with a screwed stopper) at *o*, into the vessel *n*; from whence, when the proper quantity is deposited, the surplus flows through a lateral aperture *p* into the cylinder *m*, which being duly replenished, the surplus runs off through a similar aperture *q* into cylinder *l*, thence through aperture *r* into *k*, from *k*

through *s* into *i*, and from *i* through *t* into the boiler *a* of the still. Intermediate between each of the purifying vessels is another concentric cylinder, without bottoms, their lowest edges dipping into the fluid nearly to the bottoms of the purifyers, making what is termed a water joint.

At the upper part of each of the purifyers are a series of horizontal slits or apertures for the passage of the vapours from one to the other, the course of which from the still is represented by a series of arrows. By this arrangement it will be seen that the vapours from the boiler, after ascending between the outer cylinder and the first purifyer, are compelled to descend into the liquid contained in the latter, wherein a condensation and subsequent vaporization of greater purity takes place; thence after ascending the next annular space, the vapours descend the contiguous one and undergo a second purifying in the vessel *k*; the vapours thus pass the successive annular spaces, and the purifyers *l m* and *n*; and from the last it may be presumed that the vapour will be delivered by the neck *u* to the worm or final condenser, entirely freed from contaminating matter.

The patentee observes, that the successive condensations which take place in the purifying vessels cause a partial vacuum therein, which enables him to draw off the spirit at a very low temperature, the advantage of which in avoiding empyreuma, and economizing heat, seems to be generally admitted. And when it is desired to draw off a highly concentrated and pure spirit, the vapours passing from the apparatus described, may be advantageously conveyed through a second system of purifying cylinders.

From an attentive consideration of this still, we think it is calculated to produce very economically, excellent results.

PENS.—To J. Gillott, of Birmingham, Pen Maker, a patent for "an improvement in the making of metallic pens," was granted on the 27th of September, 1831, and the specification was enrolled in the Petty Bag Office on the 27th of December, 1831.

As the extremities of the nibs of metallic pens, of the ordinary form wear, they progressively increase in breadth, until they become useless, unless their original forms should be restored by skilful filing or grinding upon an oil stone; and these being operations which no economist of time will perform at the present low prices of the article, Mr. Gillott's invention is designed to remedy the defect mentioned, by making the nibs of his pens

parallel sided, that is, of equal breadth to the points for about an eighth of an inch long, the remaining portion or upper part of the nibs being cut either inclined in the usual manner, or terminating with a shoulder next to the parallel nibs. The whole length of such nibs may of course be worn away without increasing the breadth of the strokes in writing; but of course their elasticity diminishes with their length, though not in a degree, we should imagine, to render them objectionable on that account. The openings or splits may be of any of the approved forms, best adapted to the object. We fear, however, that the nibs will not be kept well together, without tempering them carefully.

As the sketches of these pens take but little room, we have added figs. 4 and 5, Pl. II. in illustration of the foregoing.

LOCKS.—To I. Young, of Wolverhampton, Staffordshire, Locksmith, a patent for "improvements on locks and latches, and the construction of the interior and exterior thereof," was granted on the 27th of July, 1831, and the specification was deposited in the Enrolment Office on the 27th of December, 1831.

The improvements specified are five in number. The first is an additional security to a lock possessing the ordinary safeguards of wards and tumblers, and consists of an arrangement by which, what the patentee calls a "fly tumbler" is put into operation; so that when it is attempted to turn the lock by a false key, the "fly tumbler" is thrown out of its working position, and prevents the bolt from being moved. A sketch of an improved lock of this kind is given at fig. 1, Pl. II: *a a* is the fly tumbler, of the shape of letter ⊢ having a centre of motion at *a*, and a spring at *b*: *c* is a lever, kept down by a spring having a fulcrum at *d*, and a notch at *e*, which receives the upper extremity of the fly tumbler: all these parts are attached to the bolt *f f* of the lock: *g* shows the upper lever of a series (usually called tumblers,) which have a common fulcrum at *h*, and are kept steady by springs; *i* is the usual spring and follower which act upon the bolt. When the true key is used, the horizontal arm of the spring tumbler *a* slides in a groove shown in the levers *g*; but if a false key be introduced, and any one of the levers *g* should be raised beyond its assigned limit, the detent *e* is removed by the lever *c* being raised, and the operation of the spring *b* throws the fly tumbler *a* into the position shown in fig. 2, Pl. II, wherein the same letters of reference indicate similar parts to those in the foregoing. Under these circumstances the true key will not unlock it, until the key has been

turned forward, as if going to "double-lock" the lock; this operation causes the fly tumbler to press against a pin *k*, fixed to the plate of the lock, and is thereby brought to its right position, which causes it to enter the groove in the levers *g*, and the notch in the lever *c*, as shown in the former figure; the lock being thus restored to its proper condition, it may be unlocked and locked by the true key, as before.

The second improvement described in the specification does not relate to any novel mechanism, but rather to a different process of manufacturing common locks. The wards, bridge, staples, and other parts, usually termed "the works," have hitherto been fixed chiefly to the back or outside plate of the lock. This arrangement the patentee proposes to reverse, and to adapt the interior plate, or face of the lock to receive those fixtures. To carry this plan into effect he *casts*, in iron, a shallow box, (resembling the external part of a common door lock) and in this are cast the various holes for the fixing of the beforementioned parts and whatever projections are required, as well as a bar which crosses the bolts, as the narrow slip on one side of the aperture in the end plate would be liable to be broken away, without such additional defence. To the edges of the iron box are also cast rivetting pieces, so that when the case of the lock is completed, in the manner designed, by a wrought-iron plate of the same area, holes are made in the latter, through which the rivetting pieces of the cast-iron box pass, and are rivetted thereto. Thus is made a far more perfect, sightly, and durable lock, and we should imagine, at a less expence, than by the general mode. The circumstance of the interior plate being cast, will not, we think, render it more liable to destruction, even if left in the brittle state; but the "Brummagem folks" know so well how to render cast-iron soft, and malleable, that no fears need be entertained on account of the material employed.

The third and fourth improvements described by the patentee, are, two new arrangements for drawback locks, possessing considerable merit. We have not room for explanatory drawings, without which we might fail in making the subject clear. We will therefore, simply mention, that the characteristic features consist in a very small key, with two opposite bits, varying from each other, these operate upon spring tumblers on either side, and give motion to two pins, by which a circular plate is brought into action that forms the main security.

The fifth improvement is a spring latch, of a peculiar descrip-

tion, called by the patentee a "pendulum" latch; a diagram of it is given at Pl. II. fig. 3, where *a a a* represent a lever, turning upon a joint at *b*, the spring *c* pressing the bevilled extremity *d*, (which enters the keeper in the door post) through the side plate *f*. *g* is a follower, which being acted upon by a handle on the outside, opens the latch by turning it in either direction.

The four previously described inventions of the patentee we have commended in our own way; but with respect to the last described, we have the authority of the specification for stating, that "this latch turning upon a centre, *adds very much to its wear!*"

PAPER CUTTING.—To Edward Newman Fourdrinier, of Hanley, in the parish of Stoke-upon-Trent, Staffordshire, Paper Maker, a patent for "a certain machine for an improved mode of cutting," was granted on the 20th of July, and the specification was deposited in the Rolls Chapel Office on the 19th of December, 1831.

Since the application of machinery, by which paper has been made into one continuous web, it has become necessary to devise a ready method of cutting the web into sheets of any required sizes. For this purpose various machines have at different times been invented and applied; and amongst them the one before us unquestionably possesses considerable merit. It consists of a series of receiving rollers placed one over the other. The several webs of paper to be cut pass over these, are then brought together, and passed over the collecting roller equally distant from the others: and thence, by the aid of an endless felt or blanket which passes about a series of guide rollers, they are conveyed under the main cylinder of the machine, and delivered to the cutter at the opposite side at which they entered. The cutter consists of a machine which acts on the principle of shears; the lower blade being fixed, and the upper attached to an arm which vibrates upon a centre, and placed to meet the stationary blade at an appropriate angle, so as to produce the best clipping action. When a sufficient quantity of the paper has passed over the lower blade to constitute the length of a sheet, the upper blade begins to descend; but previously to the blades coming into contact, a holder, consisting of a bar extending the whole width of the paper connected with the same vibrating arm, is made to press down and hold the paper firm on the lower blade while the cutting is performed. During the operation of cutting, the main cylinder, as well as

the guide rollers, remain stationary, while an actuating rod returns to brings on another length of paper. This vibrating rod gives motion to a sector which has on its upper side ratched teeth, that are acted upon by the rod as it moves in the direction from right to left, but which remain stationary while the rod moves in the contrary direction.

The sizes of the sheets cut by this machine are regulated by an expanding crank, which gives motion to the actuating rod, and through that means to the main cylinder, and other parts of the apparatus.

FUEL.—To Lieut. H. L. Maw, of Southampton Street, a patent for "an improved method of using fuel, so as to burn smoke," was granted on the 19th of July, and the specification was deposited in the Enrolment Office on the 18th of December, 1831.

The improved method of using fuel which Lieut. Maw has invented, consists in the introduction of a fuel drawer, or receptacle for the fuel, to be placed under a grate of the usual construction, that the most volatile portion of the fuel may be liberated and consumed in its ascent through the fire; and when the coal has thus, by the liberation of the most volatile portion, been converted into coke, it is to be removed from the fuel receptacle and placed upon the fire, leaving the receptacle at liberty for the introduction of another supply of fresh fuel.

A front elevation of one of Lieut. Maw's fire-grates is exhibited by fig. 8, Pl. II. and a sectional side view by fig. 9, Pl. II. where *a* shows a fire-grate, of the usual construction, and *b* a fuel drawer, or receptacle, having a grating underneath for the admission of atmospheric air to maintain the combustion.

The openings in the grating between the fire and the fuel receptacle are made at some distance from the front, that the volatile portion in its ascent may not pass so near the front of the fire as to be cooled, lest it may escape without being consumed.

To render this invention applicable to large close furnaces, for generating steam, or other purposes, instead of the drawer above alluded to, a fuel shelf is introduced, and under an opening at the back of this shelf, a box is placed to receive the coke as it is formed and pushed back. When the box is full, or when a supply of coke is required for the fire, it is to be drawn out, which can be done with facility, as it is supported on four small wheels, for which two rails are provided.

The advantages which would result from having the fuel supplied to a fire under the ignited portion, have been long acknowledged, and various plans have been proposed for carrying such a method of feeding into effect, but we are not aware of any of them having been found to answer well till the receptacle of Lieut. Maw, which seems well calculated to effect a considerable saving in one of the most important articles of domestic consumption and comfort, as well as of extensive manufacturing utility.

GENERATING STEAM.—To Jacob Parkins, of Fleet Street, London, Engineer, a patent for "improvements in generating steam," was granted on the 2nd of July, and the specification was deposited in the Enrolment Office, on the 2nd of January, 1832.

The object of the improvements before us, is, to produce a greater uniformity of heat throughout the mass of water in a steam boiler than has been obtained by the usual construction: and this object is to be obtained by the introduction of an internal lining placed at a small distance from the bottom and sides of the boiler. This lining must be made open at the bottom, and to extend upwards to nearly the surface of the water within the boiler. Its use is to cause all the water to be exposed in succession to the hottest parts, which it does on the principle that the hottest portion of a fluid, (in this instance, that which occupies the space between the lining and the sides of the boiler), will acquire the greatest levity, and consequently ascend, while its place will be supplied by the colder portion of the fluid descending and passing through the opening at the bottom of the lining, and thus a constant circulation of all the fluid within the boiler will be kept up during the process of evaporation.

It is evident that the principle of this invention is applicable to boilers of various forms and dimensions. To a common waggon shaped boiler its application is shown by fig. 10, Pl. II. where *a a* represents a section of the boiler; *b b* the internal lining; and *c c c c* projecting pieces which are fixed to the lining, and rest against the bottom and sides of the boiler, to preserve the lining in its place.

There is less novelty about this invention than we should have expected from a man of Mr. Parkins's experience, for it will be at once perceived by the readers of the "*Register of Arts,*" that Mr. Morey invented in America, many years ago, a plan similar both in principle and details.

SHEATHING, PAINTING, &c.—To Baron Charles Wetterstedt, of Whitechapel Road, Middlesex, a patent for "a composition or combination of materials for sheathing, painting, or preserving ship's bottoms, and for other purposes," was granted on the 6th of July, 1831, and enrolled in the Enrolment Office on the 6th of January, 1832.

An alloy of lead and antimony, in the proportions of 100 parts of lead to 3 to 10 parts of antimony, constitute the sheathing plates of Baron Wetterstedt.

He mentions that less than three per cent. of antimony would make the plates too soft, and more then ten per cent. of antimony would make them too brittle.

The metals are to be incorporated by melting, and then cast into plates of about 8½ inches by 16 and half an inch thick. They are then to be submitted to the operation of the flatting rollers till their dimensions become about 16 inches by 34. Each of these plates is next to be cut into two, of 16 inches by 17, and rubbed over with an *amalgama*, consisting of equal parts of lead and zinc melted together, and suffered to cool down to about 400° Fh. when mercury is to be added, and incorporated by agitation, in sufficient quantity to make the mixture, when cold, of the consistence of honey. The amalgamated plates are again submitted to the rolling mill, and passed through in a direction at right angles to the first rolling, till they are lengthened out to 54 or 58 inches, when they are ready for use, and are to be applied to the bottoms of ships, in the manner usually adopted in fixing sheathing plates.

The patent paint for preserving wood and other materials, is proposed to be made of the skimmings of the melted metals, which are to be mixed with a resinous substance, and applied to the surface of the material to be preserved by it with a hot iron, till the pores of the wood are completely filled up and the surface so covered, as to protect it entirely from the action of the atmosphere.

TABLE-FASTENINGS.—To George Minter, of Princes Street, Soho, in the county of Middlesex, Cabinet Maker, a patent for "a fastening for dining-tables, and other purposes," was granted on the 9th of November, 1831, and the specification was deposited in the Enrolment Office on the 9th of January, 1832.

The method hitherto adopted of fastening the separate pieces of dining-tables together, is, by two straight parallel pieces of

metal, connected at one of their extremities by another piece, at right angles, which forms the handle, the two parallel pieces, or prongs, entering staples fixed underneath the flaps, and near to the edges of the parts to be joined. As these parts wear, or the wood alters in form by shrinking or warping, the fastenings become defective or useless. By the patentee's improvement these separate parts are drawn tightly in contact, by means of a wedge, which by its tapering form adapts itself to the wear, and such accidental distortions as the wood may have acquired.

At Pl. II. fig. 6, is represented one of these fastenings; *a* being a brass plate, having a hooked piece *b*, filed square in the inside and open on the side next to *a*; *d* is another brass plate, having two similar hooked pieces *e e*, open on the side next to *d*. These being screwed to the opposite flaps *c f*, of the table, the latter are brought together by thrusting the wedge *g g* (which has a handle at *h*) into the aperture formed by the hooked pieces or loops placed in c ntact.

ON A DOUBLE ACTING AIR PUMP.

By the Rev. Wm. Ritchie, A. M. F. R. S.

From the Journal of the Royal Institution.

Several attempts have been made to construct double acting air pumps; but from the fact that none of them are in use, we may conclude that the practical difficulties attending the construction of them were too great to bring them in competition with those in common use. The following contrivance appears to me sufficiently simple, and will obviously double the power without adding materially to the expense, and with very little additional friction.

It consists of a barrel, similar to Smeaton's air-pump, having a solid piston, as shown at Pl. II. fig. 7, with a piston-rod working air-tight in a collar of leather. The piston has a hole drilled along its axis the whole length of the barrel, for the purpose of receiving a brass rod, about a fifth of an inch in diameter. The upper end of the rod is slit about an inch, and slightly opened, so as to act as a spring by its friction in raising and depressing the lower valve. To the lower end of the rod is fixed the conical metallic valve V, which is allowed to rise and fall about the tenth of an inch. A bent tube T connects the upper and lower divisions of the barrel formed by the solid piston. This tube is continued from the top to the plate of the air-pump. At the entrance of this tube into the upper end of the barrel is placed a valve of oiled silk, opening inwards, to allow the air from the receiver to

expand into the upper part of the barrel when the piston is depressed. Two valves, either conical or oiled silk, are placed on the upper and lower ends of the barrel F, E opening outwards, to allow the air in the barrel to escape into the atmosphere. When the piston is depressed, the conical valve shuts the communication between the barrel and the receiver, and the air is forced out at the valve F, whilst the air in the receiver rushes into the space above the piston to supply the vacuum there formed. When the piston begins to rise, the conical valve, on the end of the brass rod, is raised, and the air from the receiver follows the piston till it has reached the top of the barrel, and expelled the air through the valve E. The next depression of the piston performs a similar office, and thus the full of the barrel of air, of the same density as that in the receiver, is at each stroke expelled, and consequently the exhaustion will go on with twice the rapidity of that produced by a single barrelled air-pump, of the same size.

Instead of the hollow tube for the piston-rod the wire might be made to pass through the piston, as in the French construction, with two conical valves on the extremities ; but the construction I have described seems to me the least liable to objection.

HIGH PRESSURE STEAM ENGINES.

Royal Ordinance of France, in relation to High Pressure Steam Engines, followed by Instructions, and a Circular, on the same subject.

Ordinance relating to High Pressure Steam Engines.

ART. 1. High pressure steam engines, those in which the elastic force of the steam exceeds two atmospheres, whether they consume their own smoke or not, cannot be set up except by virtue of authority obtained in conformity with the decree of 15th of October, 1810, for establishments of the second class.

They will, besides, be subject to the following conditions, imposed in order to insure safety.

Art. 2. When authority for setting up an engine is requested, the individual requesting authority must state at what degree of pressure the engine is to be worked.

Such pressure must not be exceeded.

The pressure must be stated in atmospheres, or in the number of pounds to each square inch of surface exposed to the pressure of the steam.

Art. 3. No high pressure boiler can be used unless it has been previously subjected to trial by the hydraulic press.

Every boiler must be used at five times the pressure under which the engine is supplied by it is to work.

Every boiler should be marked after being proved, with a

number, expressing the pressure under which it may be used, corresponding to the proof.

No individual shall use a boiler which is not marked with a number at least equal to that representing the pressure under which he has stated, in his declaration, that the boiler is to be used.

Art. 4. There shall be two safety-valves placed upon the top of every boiler, one at each end. The size and load of each shall be the same, and must be regulated, the former by the size of the boiler, the latter by the degree of pressure indicated by the proof-mark; the size of either valve will be so regulated that if raised alone, it may be sufficient to discharge the steam accumulated within the boiler.

The first valve shall be under the control of the engineer or fireman.

The second must be preserved from such control by being inclosed in a grating, of which the proprietor of the works, where the engine is used, shall have the key.

Art. 5. There shall in addition to these valves, be adapted to the top of each boiler two metallic plates, fusible at temperatures hereinafter to be stated.

The first of an area at least equal to that of one of the safety valves, shall be made of an alloy which shall melt, or soften so much as to yield to pressure, at 10 degrees of the Centigade thermometer, (18°F.) above the temperature corresponding to the proof-mark upon the boiler.

The second of twice the area of the first, shall be placed near and inclosed by the same grating, with the first safety valve: it shall be made of an alloy which shall fuse, or soften, at 20° C. (36°F.) above the proof-mark.

These plates shall be stamped with a number showing the degree of the thermometer at which they fuse.

Art. 6. No boiler shall be placed in an inclosure of less than twenty-seven times the capacity of the boiler.

The inclosure must be lighted, on two sides at least, by windows, closed by light shutters, opening outwards. It must not be contiguous to the walls of adjacent buildings, from which it must be separated by a wall of at least three feet thick, distant not less than two yards from the building. It must be separated by a wall of the same thickness from any interior workshop. There must be neither dwelling nor workshop above the boiler house.

Art. 7. The engineers of mines resident in the several departments, or in their default the government civil engineers, are charged with superintending the proving of the boilers, and fusible plates. They will stamp the proof numbers upon them with dies, which are to be furnished them for that purpose.

These engineers shall satisfy themselves, by inspection, at least once every year, that all the conditions prescribed are rigorously observed. They must examine the boilers, ascertain

their condition, and caused to be thrown out of use, those which long continued wear, or accidental deterioration, may have rendered dangerous.

The local police authorities will keep a constant watch over the works using high pressure engines.

In case of non-compliance with the present ordinance, the proprietors of the works will be subject to a stoppage of the works, without regard to the penalties, damages, &c. which may he awarded by the courts of justice.

Art. 8. Our minister of the interior will cause instructions to be published, stating the precautions to be habitually observed in relation to high pressure engines.

These instructions must be posted up in the works.

Art. 9. Our minister of the interior is charged with the execution of this ordinance, which will be inserted in the Bulletin of laws.

Given, &c. Oct. 29th, 1823.

[Signed,] LOUIS.

CORBIERE, *Minister of the Interior.*

Instructions relating to the precautions to be observed in the use of High Pressure Steam Engines.

THE use of high pressure engines requires constant care on the part of the engineers and firemen, and constant watchfulness on that of the proprietors. By neglecting the necessary precautions, the workmen may give rise to serious accidents, of which they themselves will be the first victims. By relaxing in vigilance the proprietors of the works may be the indirect cause of such accidents, besides exposing themselves to the losses which must result from the destruction of the engine, and to the injury which their business must suffer from the stoppage of work.

It is the duty of the proprietor to trust the direction of the engine to none but a man of tried intelligence and capacity, who is not only sober, and active, but who is also without any impediment to the regular discharge of his duty. Nothing should interfere with this regularity, nothing disturb or distract the attention of the engineer, otherwise there can be no security in the works.

The attention of the engineer and proprietor should be directed particularly to the following parts of the engine, viz: the furnace, the boiler, and boiler-tubes, the supply pipe, the level of the water within the boiler, the safety valves, the gauge. There are precautions to be taken also in relation to the inclosure containing the boiler.

The Furnace.

The principle according to which the heating should be regulated, is to avoid sudden changes of temperature, from cold to heat, or the reverse; in either case, the boiler is exposed to more

or less considerable inequalities of temperature, which, on account of the variable expansions caused, may occasion cracks and leaks. Thus, on first getting up the steam, the fire should not be urged too much, particularly if the furnace has been entirely cold. Time would be gained only at the expense of the safety of the boiler. When the fire has been raised to a height adequate to supply steam for the working of the engine, it ought to be kept up uniformly; it should, therefore, be stirred at proper times, and supplied with just the requisite quantity of fuel, and no more. The fire must not be suffered to go down during the continuance of the work; and if this should happen, fuel must not be supplied hastily, and in great quantities; such a supply would at first produce a chilling effect, and afterwards give out an excessive and dangerous quantity of heat.

The stirring and replenishing should be performed quickly, so as to abridge the destructive action, which the cold air introduced through the furnace door, would otherwise have upon the boiler.

These precautions are not required when the self-regulating apparatus for feeding the furnace with coal, is used; in such a case the fireman must see that the hopper is supplied with coal, and that the supply from it is uniform and continuous.

Putting out the fire, when not carefully performed, is one great cause of the accidents which happen to boilers. The best method is to leave the unburned part of the fuel in the furnace, to close the register in the chimney, as well as the door of the ash-pit, and to stop up the crevices of this door, as well as of the furnace door, with clay. By proceeding thus, the sudden cooling of the boiler, and the rapid oxidation of its exterior surface, are avoided. Besides the unburned fuel is turned to account; for not having a supply of air, it goes out, and may be readily withdrawn from the furnace when it has cooled.

Of the Boiler.

However pure water may seem to be, it deposits an earthy sediment which should not be allowed to accumulate. This deposit rapidly hardens, and increasing in thickness, it prevents the ready access of heat to the water within the boiler: thus, to supply the engine with steam, the fire must be raised, fuel is wasted, and the danger of decay and of bursting is increased.

Experiment has shown, that if potatoes in proper quantities be introduced within the boiler, the deposit is for a time prevented, the fecula of the potatoes keeping in suspension, the earthy sediment; but the viscous matter thus formed, as it increases in thickness, hinders the evolution of steam, and a period arrives, when its removal is indispensable; this period depends upon the nature of the water used. The proprietors of the engine should determine, by experiment, the proper period for cleansing the boiler, and also the least possible quantity of potatoes, if used, which will produce the desired effect. These investigations are required,

not only by a regard to safety, but to economy; since the action of the fecula will retard the production of steam.

If, notwithstanding every precaution, a boiler-tube* should crack, the engineer ought, at once, to inform the proprietor of the fact, and the latter should instantly replace the cracked tube by a new one. Patching the tube would only conceal the mischief, and the danger of explosion would be incurred.

The proprietor and engineer should observe, attentively, the oxidation of the surfaces of the generating tubes, particularly if they be of cast iron. If they find reason to suspect that any of their boiler tubes are defective, they should prove them anew without waiting for the visit of the inspecting engineer. The same remarks apply to boilers; but as the means of observation are not so frequent, the engineer and proprietor should seize every occasion to ascertain the condition of the boiler; when, for example, one or more of the generating tubes are to be replaced—when repairs are to be made to the covering of the boiler, or when it is emptied to be cleaned, the indications afforded by leaks, should be carefully attended to.

When a leak is found at the juncture of the boiler head with the boiler, or at the head of one of the generating tubes, no attempt should be made, while the engine is in action, to close the joint by tightening the screws; by so doing, a risk would be run of cracking the head; in the event of its given way, the workman would be killed by the splinters, or scalded by the steam and hot water.

When the generating tubes, or boilers, are to be cleaned, the proprietors should not require their workmen to let off the water while yet hot, particularly when the boiler tubes have not stopcocks attached to them.

Of the Supply Pump, and the level of the water within the Boiler.

When a float is used to show the level of the water within a boiler, it is of the greatest importance that the level should be kept at that indicated by the horizontal position of the lever, attached to the float. The engineer must not, however, trust entirely to the horizontal position of this lever, for information; he must satisfy himself that the motion of the float is perfectly free. He must especially be certain that the stuffing, through which the stem of the float passes steam-tight, does not press too closely upon the stem, preventing its free motion, and rendering inaccurate the indication afforded by the float.

The same precautions are necessary, when the float, by its depression, opens a valve through which water is supplied to the boiler as it is wanted.

The supply pump should be carefully attended to. If, from negligence, the level of the water within the boiler should become

* The tubes here referred to, are those below the boiler in Wolf's engine.

too low, as soon as it is ascertained, the supply should be gradually increased, otherwise accident may result. The water rising rapidly in contact with the sides of the boiler, which the fire may have heated, might produce so great a supply of steam, that the pressure would be too powerful for the boiler to withstand. The danger would be imminent if, in such a case, the safety valves were out of order, or overloaded.

If an explosion should not be produced by a defective supply of water, the least evil which could occur would be the fracture of the boiler.

Safety Valves.

In the engines where these valves are under the control of the fireman, he should study their play, and ascertain exactly what degree of adhesion they have to the valve seats. This adhesion must be attended to, even when the surface of contact is very small. The fireman should satisfy himself, by frequent trials, that these valves have the freedom of motion necessary to their perfect working. In order to this, he should raise, from time to time, the arm of the lever, to which is attached the constant weight with which the valve is loaded, to ascertain that the valve has not acquired an adhesion to its seat.

When the valves do not move freely, and when the maximum load which they are to bear, is placed upon them, they can fulfil their object but imperfectly; they confine the steam which should be suffered to escape; it accumulates and may perhaps acquire an elasticity greater than that which the boiler can resist. This fatal effect might also be produced, if, in order to work the engine more rapidly, a weight has been added to that which constitutes the proper load of the safety valve. To overload the safety valve is exceedingly dangerous; ignorance of the danger incurred would constitute the only excuse for a proprietor who should order such a thing to be done, or for the engineer who should execute such an order. The firemen ought to be well aware, that one of the chief effects of an explosion would be to allow the escape of an immense quantity of hot water and steam, which would cause their death, or inflict extreme suffering.

Such accidents are much less to be feared in engines established in conformity with the royal ordinance of October, 29, 1823, but the safety valves should not the less be watched, and kept perfectly free. In fact, if their play were stopped, ever so little, it would happen, upon the least increase of the fire, that the steam, instead of escaping, would accumulate, increasing in both temperature and elasticity; it would, after a time, melt the fusible plates applied to the boiler, the working of the engine would be thus stopped, and the proprietor must incur the inconvenience of the delay incident to the replacing of this plate. The proprietor should especially visit every day the valve under the grating of which he has the key. The valves should be ground very fre-

quently, otherwise they will suffer the steam to escape. The necessity of keeping them in order is imperative, for the workmen can only render them tight by increasing the load upon them, and the proprietor cannot too strictly prohibit their being overloaded.

When the fire is left to burn out, or when it is covered up, in order to be relighted the next day, the workshop should not be left, before it is ascertained that the safety valves are unloaded, so as to permit the steam, which is still produced to escape freely.

Of the Steam Gauge.

The gauge, being connected with the interior of the boiler, shows always the rate at which steam is generated, and the degree of pressure produced by it. The variation of pressure is shown by the motion of the mercurial column in the glass tube, and the amount is measured by the scale attached to this tube.

This instrument, when properly constructed, is of the greatest utility: to preserve it from accident, it should be enclosed in an iron, or brass, wire grating.

The proprietor should ascertain that his engine-men are duly sensible of the advantages of this instrument, and understand the manner of using it.

It is the duty of the fireman to consult the gauge very frequently, and to be guided by its indications in regulating the fire, whatever may be the resistance, arising from the work to be done, against which the machine is acting.

Of the Inclosure containing the Engine.

In order to render the effects of explosion, should such accidentally occur, less dangerous, the boiler-house must be completely insulated. The materials stored in the works should not be deposited within several yards of it. The proprietor would violate the 6th art. of the royal ordinance of Oct. 29, 1823, if he should fill the space between the neighbouring buildings and the wall about the boiler-house, with resisting materials. This wall cannot answer the purpose of that ordinance unless it has an open space around it.

Finally, it is indispensably necessary that the boiler-house should be kept under lock, so that, in the absence of the fireman, no one can have access to it. We may imagine that if the safety valves should be overloaded, or kept down by wedging, after the fire has been covered up, the accumulation of steam might occasion an accident; precaution is as necessary in this case as in those dwelt upon above. The superintending care of the proprietor, and the vigilance of the engineer, should never be wanting at any time or under any circumstances.

(Signed,) BECQUEY,
Councellor of State, and Director General of Civil Works and Mines.

Paris, 9th March, 1824.

Circular of April 1st, 1824, to the Prefects of Departments.

Sir,—You have been made acquainted with the royal ordinance of October 29th, 1823, relating to high pressure engines. According to the 8th art. of that ordinance, the instructions in reference to the precautions to be observed in the use of these engines, must be printed and posted up in the workshops.

The engineers of mines of the department, or, in their default, the government civil engineers, having been charged, by art. 7, with executing the principle parts of that ordinance, I assembled a board, composed of those members of both corps best acquainted with the subjects committed to them, and requested them to prepare a set of instructions in relation to the measures of precaution to be habitually observed, in the use of the high pressure engine. These instructions were approved on the 19th of last March, by his excellency, the minister of the interior.

I have the honour to transmit—copies. You will please to have the instructions printed, and posted up in workshops where there are engines, which come under the terms of the first art. of the ordinance of October 29th.

You will also transmit copies to the proprietors of engines, requesting them to make abridged extracts from them, applicable to the kind of engine which they use.

I am now preparing materials for a second set of instructions, in relation to the execution of the 3rd, 4th, and 5th articles of the ordinance; these articles refer to the proof to which the boilers must be subjected, to the valves to be applied to each end of the top of the boiler, and to the two fusible plates intended to prevent explosions.

I shall have dies made, to be sent to the engineers whose duty it is to have marked upon every boiler, the degree of pressure with which it has been calculated to work, and according to which the proof has been made, as also, the temperature at which the metal plates attached to the boiler are fusible.

Under existing circumstances, to secure manufacturers as much as possible from accident, I beg you to attend at once to the execution of art. 6th of the ordinance, according to which a boiler must not be placed in an enclosure of less than twenty-seven times the capacity of the boiler.

The enclosure must be lighted on two sides at least, by windows closed by light shutters opening outward. It must not be contiguous to the walls of adjacent buildings, from which it must be separated by a wall of at least three feet thick, distance two yards from the building. It must be separated by a wall of the same thickness from any interior workshop. There must be neither dwelling nor workshop above the boiler-house.

I shall have the honour to transmit hereafter to you, and to the engineers of mines, and civil engineers, new instructions in relation to the valves, the fusible plates, and the application of the dies, &c. (Signed) Becquey.

Counsellor of State, and Director General of Civil Works and Mines.

STRENGTH TEST FOR BLEACHING POWDER.

The necessity of having a means of ascertaining the chlorine strength of bleaching powder has been felt so strongly, that many persons have turned their attention to the discovery of an unexceptionable process for the purpose; and the use of sulphate of indigo, or the salts of manganese, and of the chlorometer apparatus of Gay Lussac, is consequently well known to all who are concerned in the use of that chemical production. M. Marozeau, amongst others, has sought to obviate the objections belonging to all the processes known, and has described, as the result of his exertions, a new process founded on the arc of mercurial salts. Let muriatic acid be added to a solution of protonitrate of mercury, in quantity more than sufficient to precipitate all the mercury as calomel; then let a solution of chloride of lime be added; the chlorine set at liberty by the excess of acid will react on the calomel, and convert it into corrosive sublimate, which dissolving, the solution will become perfectly clear and transparent again, if enough chloride of lime has been added.

This effect when produced by known solutions of mercury and bleaching powder, and with the attention required to obtain a complete chemical action is said by M. Marozeau to furnish a very excellent method of ascertaining the strength of bleaching powder; for by agitation of the liquids, all the calomel at first formed may be converted into corrosive sublimate, and dissolved before the slightest odour of chlorine is sensible in the residual liquor. He uses the chlorometer of M. Gay Lussac, but inverts the office of the pipette, or fixed measure of bulk; instead of using it to measure out the bulk of solution of chlorine to be tried, it is employed to measure out a fixed quantity of the test solution of the nitrate of mercury, and the graduated jar is used to ascertain the quantity of solution of chloride required to convert the calomel, when formed, into corrosive sublimate.

The strengths of the solutions of nitrate of mercury and bleaching powder to be tried are made to conform to the dimensions of the instruments constituting Gay Lussac's chlorometer. The proof liquor is procured by boiling mercury in excess in dilute nitric acid, continuing the ebullition until no deutonitrate remains in solution. The strength is adjusted in two ways, either by preparing a solution of the chloride of lime with a known quantity of chlorine, and then trying it against the test solution as yet unadjusted, and diluting the latter until it agrees with this known solution,—or by ascertaining how much of the test liquor is required to precipitate the whole of the chlorine in a known solution of common salt. For as the quantity of chlorine in common salt required to convert the mercury in a given quantity of test solution into calomel, is exactly equal to that required afterwards from chloride of lime to convert the calomel so formed into corrosive sublimate, it is easy to make a known solution of salt, and to dilute the test liquor, until a given quantity of it will exactly precipitate a measure of that saline solution; and such test

liquor will by the process recommended, show what quantity of the solution of bleaching powder contains the same proportion of chlorine as the standard of salt thus referred to.

M. Marozeau then gives minute instructions for the use of this process, intended for those who not possessing much chemical knowledge, still have to apply the instrument; and he states, that having used it very constantly, it has afforded him highly satisfactory results. *Annales de Chimie.—Quar. Jour.—Roy. Inst.*

AMERICAN PATENTS.

For a mode of Causing Cloth to pass, and be stretched while passing, over a Revolving Cylinder prepared with points, or teazels, for teazing, or raising, the pile or nap upon the cloth; JOHN JEWEL, *Dudley, Worcester county, Massachusetts, December* 30.

THE specification of this patent is written with unusual precision and clearness, and the machinery described is well represented. All we can give is a general idea of the plan pursued, so far as it can be understood by a quotation from the beginning, and another from the end of the specification. The whole description would occupy several pages of the journal.

"The cloth to be teased, is to be wound npon a revolving cloth beam, and from that made to pass over and under rollers, and over the revolving cylinder prepared for teazing it; and over and under rollers on another revolving cloth beam, on which it is to be wound up as it comes from the first beam, after having passed over and under the rollers and cylinder aforesaid; and then, by a change of motion, after it has been unwound from the first beam, it may be made to pass back over and under the rollers and cylinder aforesaid, and be again wound upon the first beam, as it comes off from the beam upon which it was last wound up, the motion of the cloth beam and rollers been given, regulated, and changed, in the manner hereinafter described and explained, which description may be best understood by reference to the plan hereunto annexed."

Conclusion.—"It is to be understood that although I have in my plans, and the explanation thereof, mentioned a cylinder prepared with points or teazles, for teazing cloth, yet, I do not claim as a part of my invention, such a cylinder, either separately, or in combination, nor the raising of naps on cloth by means thereof; and although I have mentioned stretching rollers, which ought to be the stretching rollers now used for stretching the cloth widthwise, yet I do not claim the same, either separately or in combination, as a part of my invention, nor the stretching of cloth widthwise. And, as to the rest of the machinery described, none

of it is claimed separately, and only so much of it in combination as is adapted to give motion to, and regulate and change the motion of the feeding rollers, so as to regulate and change alternately the motion of the cloth, and draw it tight and smooth over the cylinder prepared for raising the nap upon it."

A patent for an improvement in the mode of propelling spindles or machines for spinning wool. Granted to Russel Phelps, *Andover, Essex county, Massachusetts, December* 21, 1830.

In all the machines now used for spinning wool, which are called jacks, or billies, or jennies, the mode of propelling the spindles is by applying the power to one end, or the middle, of a cylinder, from which the spindles are successively banded.

My improvement consists in applying the power to both ends of the cylinder at once; and in order to produce this effect, I make a shaft of sufficient strength and length, to extend the whole length of the spinning frame, and attached thereto, on the back part of the frame; on each end of which shaft I secure a pulley, or wheel; to this wheel or pulley, I attach a band or belt, which after passing over fixed pullies, in front of the machine, is strained over corresponding pullies, on each end of the cylinder which drives the spindles. This principal shaft is driven from the centre, or from any other point in its extension; and the effect of communicating motion from both ends of the shaft, to both ends of the cylinder, is to give a perfectly steady motion to the carriage, to which the cylinder is attached, and of necessity to the spindles connected therewith, and thus to produce better work; it also comes in aid of the squaring bands, in maintaining uniform motion. The great advantage derived from applying the moving power to both ends of the spinning frame, is, that by rendering the operation of the machine more easy and uniform, the number of the spindles may be multiplied to suit the convenience of the operator. In the jacks and billies commonly used in this country, one hundred and twenty spindles are the usual number attached to each frame; by the introduction of my improvement, double the number can be driven with equal ease, and without any additional skill on the part of the operator. Russel Phelps.

A patent for a new mode of manufacturing Spoons from tin plates, tin or pewter in sheets, sheet silver, or other metal. Granted to Robert Butcher, *of the city of Philadelphia, December* 27, 1830.

To all whom it may concern, be it known, that I, Robert Butcher, have invented a new mode of manufacturing spoons from

tin plates, tin or pewter in sheets, sheet silver, or other metal, by means of cutting and stamping presses, and that the following is a full and exact description of my said invention.

When I manufacture spoons of sheet tin, I usually employ that which is known as three or four cross. This I planish, or hammer, with a polished steel hammer, upon a polished steel anvil. This not only polishes the surface, but condenses the metal, and thereby renders it the more durable.

When I use rolled sheets of block tin, pewter, silver, or other metal, or mixture of metals, I generally polish such sheets on both sides before proceeding to make the same into spoons; this, however, is not essential to the process.

In order to make the above named, or other metallic plates into spoons, I first cut the metal into the exact form required, by means of a steel bed, and cutter, in the way well known to the workers in metal. Any of the screw, lever, or drop presses usually applied to such purposes may be employed.

The blank or flat pieces for spoons being thus prepared, they are raised by means of a drop, or fly press, or by any other adequate application of power. A die, with a metal forcer, being employed for this purpose.

I do not claim to have invented any part of the machinery applied to this manufacture; but what I claim as new, is the manufacturing of spoons, without either casting or forging, by cutting and raising them out of sheet metal, in the way herein described; the same being a new manufacture.

ROBERT BUTCHER.

For an Economical Oven; ABEL STOWELL, *Medford, Middlesex county, Massachusetts, December* 14.

THIS is intended as an improvement on the common bake pan. A square box of iron is made, resembling the oven in a common cooking stove, and having a door on one side in the same manner. This box has a bail to it, by which it may be suspended, and has legs that it may stand on the hearth, with fire beneath it. Within the oven there is a moveable shelf dividing it into two parts. On its top there is a ledge, like that on the lid of a bake oven, to retain the fuel placed on it.

"What I claim as my invention, is an improvement on the common baking pan, by making the opening through which the articles to be baked or cooked may be placed within, or withdrawn from the said oven in a lateral situation, and which opening may be closed by a door connected to the oven, instead of the moveable cover as is usual; by which means baking or cooking may be effected in a more economical, cleanly, and expeditious manner, without subjecting the operator to the inconveniences attending the employment of the baking pan in common use."

MOLASSES.

In the Report of the Select Committee appointed to inquire into the expediency of admitting the use of Molasses in Breweries and Distilleries of the United Kingdom.

It is stated in evidence that the total quantity of molasses produced in the West Indies amounts to 16,000,000 gallons, or about 1,454,000 cwts.; of which it is calculated that about 1,000,000 cwts. comes to Great Britain in the shape of rum and molasses. The proportion of rum to molasses being as seven to four.

It is also stated, that the extreme quantity which would be supplied for the use of the breweries and distilleries would be about 500,000 cwts.

The quantity of molasses equivalent to the quarter of malt, *i.e.* which will yield in solution an equal quantity of saccharine matter, or produce a wort of the same density with a quarter of malt, is variously stated by different witnesses.

By Mr. Green, 224lbs. of molasses are reckoned equal to one quarter of malt; by Mr. Heathorn, 252lbs. are stated to be equal to one quarter of malt.

Dr. Ure, from very elaborate experiments, states that 295lbs. of molasses are equal to one quarter of malt weighing 322lbs.; that 275lbs. are equal to one quarter of malt weighing 302lbs.; and that the average equivalent of one quarter of malt would be about 285lbs.

With regard to the extent of the demand, this will very much depend upon the admission of molasses being limited to breweries, or extended both to brewers and distilleries; and your committee will have occasion to revert to this part of the subject in discussing the question of the use of molasses in breweries. But your committee are of opinion that there are cogent reasons for supposing that the supply of molasses could be increased beyond 500,000 cwts. to an almost unlimited extent; for it is stated by competent witnesses that a much larger proportion of cane juice might be converted into molasses in the West Indies than at this moment so converted, were it for the interest of the planter so to do, and that such a procedure may become the interest of the colonist is proved by the fact, that whilst the quantity of molasses imported into this country since the allowance of a drawback on the exportation of refined sugar has very rapidly increased, the quality of the article has become gradually richer, and it has contained a larger proportion of sugar.

It appears from the Parliamentary returns, that the quantity of molasses imported in the three years ending 1822 was only 166,833 cwts., whereas, in the three succeeding years ending 1826, it rose to 764,067 cwts., and in the three succeeding years ending 1829 it reached 1,182,029 cwts.; and your committee, adverting to this great increase in nine years, mainly arising from

the sugar drawback, see no reason to doubt that the supply would be further extended in a similar ratio, if stimulated by the additional demand which would be created by the admission of molasses into the breweries and distilleries.

It appears from the statements of Messrs. Calvert and Martineau (the latter a partner of Messrs. Whitbread), that the houses who brew the best and purest quality of porter would be very unwilling to adopt the use of molasses, unless, indeed, in trifling quantities as colouring matter, in place of burnt malt. Mr. Calvert states, that no beer can be so good as that brewed from malt and hops; he adds that in 1800, when owing to scarcity, the use of sugar was permitted in the breweries, he ceased to employ that article when malt fell to 75s. or 80s. per quarter.

Mr. Martineau is further of opinion, that the admission of any other ingredient besides malt and hops, would be injurious to the reputation of the brewers of pure porter, because it would afford a great facility for the admixture of inferior beer made from molasses by the retail dealer; and he is very apprehensive lest the natural and necessary distrust created in the public mind as to the purity of the beer, *i.e.* to its being really made of malt and hops alone, should tend to diminish consumption, and so seriously to injure the honest trader. Both those gentlemen entertain doubts whether beer made of molasses would answer for keeping. In pale ales molasses would be inadmissable on account of its colour; but it does appear that it might be used to a very considerable extent in table beer for immediate drinking, and that it will make a palatable beverage.

In making beer, however, from molasses, it does not seem that the process could be carried on without a proportion of malt; and it is stated by Messrs. Green and Heathorn, that they would use, according to the kind of beer they wished to make, from one-tenth to one-fourth parts of molasses, mixed with from nine-tenths to three-fourths of malt.

By the present law 24s. per cwt. is allowed the refiner on the exportation of sugar obtained from molasses; and it has been stated by Mr. Brown, a sugar refiner, that from 30lbs. to 38lbs. of sugar are procured from one cwt. of molasses.

Hence the drawback on the sugar obtained will be equal, or nearly equal, to the import duty paid on molasses; and the proportion of saccharine matter contained in one cwt. molasses being about 70lbs., the refiner's treacle, with 30 or 40 per cent. of saccharine matter, will come into the market duty free, whilst the high impost of 1*l.* 0s. 8d. per quarter is levied on malt.

The objections which have been stated to the committee against the use of molasses in the distilleries appeared to them to be even stronger than those which already stated with respect to the breweries.

The amount of revenue derived from British spirits, amounted in the last year to the sum of 5,209,599*l.*

Under the old law in England the duty was charged on the wash, and it therefore became the interest of the distiller to use wash of the greatest fermentable gravity in order to obtain the greatest possible quantity of spirits from the wash on which the duty was charged. The spirits obtained from wash of such high gravity were of a very inferior quality, and before they could be sent out for consumption required to be rectified. This mode of charging the duty is therefore quite inapplicable to Scotland and Ireland, where the spirits are universally consumed in the state of whiskey, without having been rectified.

By the present law the duty is charged on the quantity of spirits produced, and the distiller is allowed, within certain limits, to make his wash of whatever gravity he prefers.

For the purpose of preventing frauds by the abstraction or concealment of any portion of the spirits produced, an account is taken of the quantity of the wash, and of its specific gravity, at various times during the process of fermentation, and an estimate is made, according to the degree of attenuation which the wash may reach, of the quantity of spirits which can be produced from it.

By the present law, the two operations of brewing and distilling cannot be carried on at the same time by the distiller. Now mashing occupies a considerable length of time, and cannot be carried on without the knowledge of the excise officer superintending the distillery, it is impossible for the distiller to add fresh worts, for the purpose of increasing the strength of the wash, without detection; whereas, if he were allowed to have sugar or molasses on his premises, he might easily, after the process of fermentation had commenced, add a quantity of either of these materials to his wash, and thus greatly increase the quantity of spirits which it would produce, rendering the check arising from the calculation of the density of the wash completely nugatory.

Dr. Ure observed that it would be preposterous to attempt to make a good experiment with a small quantity, such as a bushel of malt, which has often been done by chemists; for it has been ascertained by experiments on a greater scale that the product in the small way falls short of the product of the great brewers by eight per cent. Accordingly we find that Mr. Hetherington, who had made some experiments at the St. Catherine's Distillery with the same quantity of molasses wash which Mr. Steel had employed, states the produce of proof-spirit from one cwt. of molasses at 7.14 gallons, whereas Mr. Smith, an eminent distiller, has stated that in 1800 he could produce from one cwt. of molasses 7.34 gallons of proof spirits; but as it appears that since that period great improvements have been made in the process of distillation, there can be little doubt that eight gallons could now be prduced; and this also is the result of the experiments of Dr. Thomson.

MISCELLANEOUS.

Preservation from Shipwreck.—On the 22d of August, M. Monin presented a memoir on the subject. He proposes to fix round the vessels in stormy weather large bladders made of the hides of oxen or horses, and filled with air, which would sustain the vessel, and prevent its sinking even when filled with water. He also proposes to diminish the dangers arising from vessels striking against rocks, by placing impermeable mattresses of hair or old linen between the coppering and the wood of the vessel.

Cholera Morbus.—On the 18th of July, M. Majendie read a latter from M. Scipion Pinel, a surgeon at Warsaw, in which it is maintained that the cholera morbus affects principally the sympathetic nervous system, as is proved by the weakness produced in the general circulation, which is not accounted for by any sufficient affection of the heart or the organs of circulation, and can only therefore be produced by a diseased state of the nerves, particularly the grand sympathetic or *trisplanchine* nerve. He therefore proposes to give the disease the name of *trisplanchine*. M. Pinel adds, in proof of the disease not being directly contagious, that he has infused into his own veins not only the blood of a dying patient, but even the intestine mucus taken from a dead body. But he remarks, that when he remains more than a quarter of an hour in the room with the patients, he experiences a feeling of painful oppression in his stomach, in the direction of the vertrebral column, which is removed by going into the open air. The treatment recommended by M. Pinel differs principally from that hitherto adopted, in prohibiting narcotics; but he agrees with other physicians in recommending warm drinks, and all other applications tending to restore heat to the surface of the body, and increase the circulation.

Relief for the Tooth-ache.—The following account is by Dr. Ryan, who himself testifies to the efficacy of the remedy recommended. Like many of our best remedies, that which I proceed to notice (for the tooth-ache) was discovered by accident. A gentleman who attends my lectures (Mr. Myers, of Newington Causeway), had frequently applied sulphuric acid to his tooth with some relief, but on one occasion he, in a moment of confusion, took down the next bottle to his remedy, which contained nitric acid: to his great surprise he experienced immediate relief, and without the slightest pain. Since that period he has not suffered from tooth-ache, though three years have now elapsed. During the last winter he informed me of the success of this remedy, which induced me to try it while labouring under the most intense pain from tooth-ache. The effect was immediate, and no pain whatever was induced. I have since used it in numerous cases, and invariably with complete success. In some instances the disease does not return for days or weeks, and in others not for months.

The best mode of employing it is by means of lint wrapped round a probe, and moistened with the acid, which is then to be slowly applied to the cavity of the tooth, care being taken not to

touch the other teeth, the gums, or the cheeks. On withdrawing the probe, and inquiring how the patient feels, the usual reply is, "the pain is entirely gone." The mouth is next to be washed with tepid water. The acid should be gradually applied to the whole cavity of the tooth, or otherwise a second application will be required before complete relief will be obtained.

This remedy may be used when the gum and cheek are inflamed so as to preclude the possibility of extraction. In cases where the diseased fang remains, and when the caries faces the adjacent tooth, it obviates the necessity of extraction in all cases of hollow teeth, which all practitioners declare to be desirable if possible, and it enables the dentist to perform the operation of stopping or filling teeth much sooner than he can otherwise accomplish. In a word, it will alleviate a vast deal of human suffering, and supersede a most powerful operation. It does not accelerate the decay of the tooth to which it is applied.—*Lond. Med. Jour.*

Sand Manure.—On the 19th of September, M. Chaptal, in the name of himself and M. Silvestre, read to the academy of Sciences at Paris a report on a memoir presented by M. Dutrochet at the last meeting, and entitled "*Sur le Sable Silicieux comme Substance fertilisanse.*" The earth forms the support of plants; air, water, heat, and manure, are the nutritive principles which stimulate the action of their organs. Arable land is generally formed of a mixture of four primitive earths, the various proportions of which constitute the difference of soils, but no one of which would be alone sufficient to constitute good arable land. Chemical analysis has informed us of the proportion in which these earths are to be mingled in order to constitute a good soil; and it is of the highest importance to agriculturists that they should avail themselves of this information in regulating and improving their ground on the best soils silex is predominant. In the most fertile of the banks of the Loire, it forms 49 per cent. Davy found it 60 per cent. in the best soils of England, and Giobert mentions that it is as high as 79 per cent. on a very fertile soil in the neighbourhood of Turin. The experiments of M. Dutrochet have confirmed the advantage of employing siliceous sand in certain earths. He covered an argillaceous field with non-effervescent pit-sand *(sable de mire)*, and obtained from it much more abundant crops than from similar fields which had not been prepared in the same manner. M. Dutrochet has not contented himself with the mere relation of facts, but has with great ingenuity accounted for them by tracing the fertilizing qualities of silex to the manner in which it renders the roots of the plants accessible to the air and water from which they derive their powerful nourishment.

Vibration of Sound.—M. Savart has communicated to the Academy of Sciences at Paris the result of his experiments made with an instrument, invented by himself, for the purpose of ascertaining the greatest and least number of vibrations, per second, of which a sound may be composed, so as to be perceptible to the human ear. He had previously ascertained that, in extreme sounds resulting from

more than 40,000 simple oscillations per second, may be distinctly perceived; and he now stated, that, in the other, sounds may be produced by his machine which are not only perceptible, but even intense, although composed of but eight vibrations per second. The lowest limit of perceptible sounds, produced without the aid of his machine, was thirty-two vibrations per second.

Human Nutrition.—On the 11th of July a letter was read from M. Roulin, a young physician of eminent attainments, both medical and scientific, in which he vindicated the nutritive properties of gelatine, and pointed out the absolute necessity of salt entering into the regimen of animals upon whom the effect of different alimentary substances was to be tried. As a proof of the manner in which animal strength may be supported, he related the remarkable fact, that in travelling through some forests in Columbia, in 1825, he and his guides, being entirely without provisions, were compelled to eat five pair of sandals (made of untanned leather, softened by the dampness of the forests), and a deer-skin apron, which they roasted and masticated. In the latter operation, two hours were occupied in getting through the third part of a sole of a sandal. This singular aliment supported their strength; and though the journey, which was to have lasted only two days, occupied fourteen, they arrived at its termination in good health. They occasionally ate the core of the palm-trees, but found that it sustained their strength much less than a piece of roasted leather.

Method of marking Linen.—The necessity of marking the linen of hospitals, &c. in a perfect and durable manner, so as to resist the action of alkalies, soap, &c. is so important as to have induced M. Henry to examine the methods in use, and endeavour to replace them by a better. The sulphate and muriate of manganese, the sulphate and acetate of iron, nitrate of silver, acetate of alumine and iron, and acetate of lead, mixed with gum or indigo, or ink, have been used for the purpose; but all either require previous or subsequent operations of some nicety, as immersion in carbonated alkalies or hydro-sulphurets, or else such degree of care as to be inexpedient in the hands of the women or persons to whom the duty generally devolves.

The following is the process which M. Henry ultimately recommends as the very best. Take one part, by weight, of iron filings, and three parts of vinegar; or acetic acid of s. g. 1066. Mix the filings with half the vinegar, and agitate it continually. As it thickens, add the rest of the vinegar, and also one part of water. Then apply heat to assist the action, and when all the iron is dissolved, add three parts of sulphate of iron, and one part of gum arabic, previously dissolved in four parts of water. These are to be mixed well at a gentle heat, and will yield twelve parts of the preparation.

When to be used, the linen is to be spread on a table, and the preparation applied by means of a hair brush, and stencil plates of copper.—*Jour. de Pharm.* 1831, *p.* 388.

CONDUCTION OF SOUND BY WATER.—M. Cagnard Latour has communicated to the French Academy of Sciences an experiment which he had made with an instrument called the *Syren*. It is well known, that if the instrument be set in motion by a column of water of sufficient elevation, a sound resulting from the vibrations of the liquid itself is produced even when the instrument is completely submerged. M. Latour ascertained, that by plunging himself into the water, and putting the *Syren* in motion by injecting the liquid by means of a pump held in his hands, the sound increased intensely the moment his ears were submerged, although his distance from the instrument remained the same, thus proving that the hydraulic vibrations were directly transmitted to the auricular organs with more energy than when transmitted through the medium of the atmosphere. M. Latour also found that the intensity of the sound did not vary materially in proportion to the depth to which he submerged himself; whence, he concludes, that the augmentation of the pressure of the air contained in the ears did not operate on the phenomenon, but that it depended mainly on the immediate hydraulic communication.

CURE OF FEVER.—M. Majendie has made a very favourable report of the use of powder of holly leaves, recommended by Dr. Rousseau as a cure for fever, it having been tried in the hospitals in thirteen different cases. The doses administered were from one to five *gros* per day, and in every case the patients were cured after about twenty days treatment. The effect of the holly is not so quick as that of the quinia and silicine, but is a sure and excellent febrifuge. The only thing necessary to make it thoroughly useful, was to extract its essential properties, so as to avoid the necessity of administering it in such large quantities.

List of New Patents omitted in our last Nnmber.

CORDAGE.—To R. W. Sievier, of Southampton Row, Bloomsbury, Middlesex, gentleman, for improvements in the manufacturing of cables, ropes, whale fishing, and other lines, lathe and rigger bands, &c. and applicable to other purposes.—Specification to be enrolled in six months. Dated Dec. 1, 1831.

SILK PRINTING.—To C. M. Payne, of Stratford, West Ham, Essex, silk printer, for improvements in printing silk, cotton, and other goods.—Dec. 15, 1831.—Six months.

MILLS.—To C. M. Savoye, of Oxford Street, Middlesex, merchant, for improvements in mills or machines for grinding or reducing grain and other substanres.—Dec. 15, 1831.—Six months.

FIRE ARMS.—To A. A. Moser, of Canterbury Row, Kennington Road, Surrey, engineer, for improvements in certain descriptions of fire arms. Communicated to him by a foreigner.—Dec. 15, 1831.—Six months.

LACE.—To T. Alcock, of Claines, Worcester, lace manufacturer, for improvements in machinery already in use for the manufacture of bobbin net lace.—Dec. 15, 1831.—Six months

MEDICINE.—To I. Strombom, of Old Broad Street, London, merchant, for a medicinal composition or embrocation for the cure or prevention of external and internal complaints, and which may be beneficially used as an internal medicine.—Dec. 17, 1831.—Six months.

SCREWS, &c.—To D. Ledsam and W. Jones, screw manufacturers, of Birmingham, Warwick, for improvements in machinery for making pins, rivets, wood screws, and nails.—Dec. 22, 1831.—Six months.

SPINNING.—To H. Gore, of Manchester, machine maker, for an improvement in the machines commonly called by the spinners "throstle machines," which machines operate by spindles and flyers; and bobbin for spinning or twisting yarn or threads.—Dec. 22, 1831. Six months.

FANCY COTTON.—To P. Greaves, of Chorley, Lancaster, gentleman, for a method of making ornamental or fancy cotton yarns or threads, applicable to embroidering cotton and other fabrics.—Dec. 22, 1831. Six months.

METAL PLATES.—To J. C. T. Kreeft, of Old Bond Street, London, merchant, for an improved apparatus for shaping plates of metals, and manufacturing articles therefrom. Communicated to him by two foreigners residing abroad.—Dec. 22, 1831.—Six months.

STEAM ENGINES.—To S. Hall, of Basford, Nottingham, cotton manufacturer, for an improved piston and valve for steam, gas, and other engines, and of condensing steam, &c.—Dec. 22, 1831.—Six months.

FURNACES.—To B. Nott, of Liverpool, esq. for improvements in the construction of furnaces for generating heat, &c. being further improvements upon a patent obtained by the petitioner, dated Nov. 4, 1830. Communicated by a foreigner.—Dec. 22, 1831...Six months.

FLOORING.—To M. Muir, of Hutchinson Town, Glasgow, Scotland, engineer, for improvements in machinery for preparing boards for flooring and other purposes.—Dec. 22, 1831.—Six months.

BEDSTEADS.—To R. W. Wingfield, of Birmingham, Warwick, brassfounder, for improvements in the construction of bedsteads, which improvements are applicable to other articles.—Dec. 22, 1831.—Six months.

LIST OF NEW PATENTS SEALED.

IRON.—To J. S. Dawes, of Bromford, West Bromwich, Staffordshire, iron-master, for improvements in the manufacture of iron.—Specification to be enrolled ins ix months.—Dated Dec. 22, 1831.

LACE.—To W. Sneath, of Ison Green, Nottingham, lace-maker, for improvements in machinery for the manufacture of bobbin net lace.—Dec. 31, 1831.—Six months.

PAPER.—To J. Dickinson, of Nash Mill, Hertfordshire, Esq. for improvements in the manufacture of paper.—Jan. 10, 1832.—Six months.

CAPSTANS.—To Lieut. J. Lihou, R. N. for an improved method of constructing capstans. Jan 10, 1832.—Two months.

PADDLE WHEELS.—To E. Galloway, of Blackfriars Road, engineer, for improvements on paddle wheels.—Jan. 17, 1832.—Four months.

PIG-IRON.—To M. Teagne, of Park End Iron Works, near Calford, Gloucestershire, iron-master, for improvements in making and smelting pig-iron.—Jan. 17, 1832.—Four months.

TO OUR READERS AND CORRESPONDENTS.

The Sketches of Mordan & Brockedon's new patent Pens, which were omitted in our Pl. XIX. of our last number and volume, are inserted in Pl. I. of our present number and volume, and are marked with the letters and other references contained in the previous description of them.

PATENTS ENROLLED BETWEEN 10TH JANUARY, AND 10TH FEBRUARY, 1832.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

STOVES.—To J. Pycroft, of Rolleston, near Burton on Trent, Gentleman, a patent "for improvements connected with grates, and other fire-places," was granted on the 13th of July, 1831, and the specification was enrolled in the Enrolment Office on the 13th of January, 1832.

It is proposed by this patentee, to have in connection with the fire stove a chamber for hot air, to be admitted at pleasure either into the apartment where the fire is, or into any adjoining room where heat may be required. A sketch of the proposed stove is given at fig. 1, Pl. III. where *a* shows a fire-place, with fire grate of the usual construction. *b b* portions of the hot-air chamber, which extends from below up behind, and on each side, and also over the top of the fire, where it assumes an angular form, as represented by the drawing. The air passes into the chamber by a series of registers, situated below the fire at *c*, and when heated passes out into the room by a series of registers situated over the fire at *d*, in the direction shown by the arrows. When it is intended for the sake of ventilation, to receive the air to be heated from the external atmosphere, instead of from the room where the fire is situated, the registers below the fire must be closed, and a communication opened between the external air and the lower part of the chamber. And when it is intended to throw heated air into an adjoining apartment, the registers above the fire are to be closed, and a communication opened between the upper part of the chamber, and the apartment to be heated.

A blower or hood is shown at *e*, which is hinged to the upper part of the stove, that it may at pleasure be brought out towards the front of the fire, as shown by the dotted lines. Behind this is another hood or blower *f*, which is raised or lowered by a nob, passing through the first at *e*; this inner hood is provided with two angular side flaps, which, when the blower is brought down and projected forwards, as shown by the dotted lines, enclose the sides of the fire, while the plate *f* rests on the front bar of the grate, and thus the fire can be made to burn quickly when required, or smoke in the room entirely prevented, or rather the draft of the chimney may, by this means, be regulated at pleasure. There is, however, another method of regulating the draft of the chimney, shown by the folding damper or valve *g*, which is hinged to the back of the flue, and

rests, when closed, upon a projecting ledge on its front. This valve is to be opened or closed by means of the rod i and the projecting nob k.

CABLE STOPPER.—To W. Batten, of Rochester, Gentleman, a patent "for an apparatus for checking or stopping chain-cables, and which may be applied to other purposes," was granted on the 13th of July, 1831, and the specification was enrolled in the Enrolment Office on the 13th of January, 1832.

This patent cable stopper is represented by fig. 3, Pl. III. where a a show a portion of the upper edge of the hatchway, where the chain cable is kept when not in use, and through the corner of which it is dragged as the anchor descends. b c show a curved bar, which constitutes the check. It is placed under the deck which is shown partly cut away, to exhibit the different parts of the apparatus. The check bar turns upon a pivot at d, and is brought up so as to press against the chain cable in the corner of the hatchway, by means of the cord e e e e and the lever f, which turns on a pivot g placed eccentrically with respect to the curved end h. The end e of the check bar as well as the end i of the lever f, is furnished with a pulley, round which the cord e is passed, after being fastened to the end of the check bar c. Now, it is evident, that any force applied to the cord e to drive it in the direction of e k, will, through the medium of the pulleys, cause the ends i and c to approach with thrice the force employed, and thus bring up the check upon the cable against an iron projection, placed under the deck at the corner of the hatchway, to form a resistance to it. Besides this mechanical power of the pulleys, there is an augmentation of power of more than two to one obtained from the difference in the lengths of the arms of the check bar, which is a lever of the second kind. In addition to these power increasing arrangements, the turning of the lever f on its axis of motion g forces back, by the contact of receding portions of the curve h, the end b of the check bar, and thus increases pressure on the chain when the stop is brought into operation. There are cords attached by several hooks to the ends c and i, for the purpose of releasing at pleasure the chains from the check bar.

That this apparatus will answer the purpose for which it has been designed there cannot be the smallest doubt; but it is not so clear that the patentee has taken the most simple means to accomplish the end which he had in view.

Sugars.—To Marmaduke Robinson, of Westminster, navy agent, on behalf of Lieut. W. H. Archbald, R. N. residing at Louisiana, in America, a patent "for improvements in the making and purifying sugars," was granted on the 27th of July, 1831, and the specification was enrolled in the Petty Bag Office, on the 27th of January, 1832.

The improvements above referred to are twofold: the first mentioned, is a boiler or sugar pan intended to accelerate the evaporation, or rather the concentration of syrups. It is a vessel three feet in depth, and four or five feet in diameter; the bottom and sides to the height of fifteen inches are made of copper, and the remainder of wood, a preference being given to the red Dantzic fir. The bottom is stated to have holes made in it of four or five inches in diameter, into which copper cups are to be inserted, of such a depth as to hang or jut out about three inches beyond the bottom; and these copper cups are directed to be *six inches in diameter* and four inches deep! A confused description of a flue follows, which is said to enter the vessel at three inches above its bottom, pass through the centre, and be left open at both ends, and corresponding holes are directed to be made in the sides of the vessel for the flame to pass freely through to expedite the evaporation. This flue is to be four inches deep and twelve inches wide, and care is to be taken in removing the syrup not to leave the flue uncovered with it, and if the whole contents be discharged that the fire be previously reduced or damped. It is recommended, that the vessel be cleansed out daily, to prevent the incrustation of the depositions; and the description concludes with a specific claim to the foregoing notable apparatus, as well as a modified arangement of it, in which the cups are inverted, so as to form recesses for the flames and heated air to operate therein and produce a rapid evaporation.

The invention, which constitutes the second claim under this patent, is an apparatus by which the contents of a range of coppers may be discharged and transferred from one to the other, by the pressure of the atmosphere upon a vacuum effected in a separate vessel. A sketch of this apparatus is given at Pl. III. fig. 2, wherein *a* represents a boiler, *b* a steam pipe, and *c* a cock for regulating the admission of the steam into *d*, which is a strong air-tight vessel of copper in which the vacuum is effected; it has an air cock at *e*, and five pipes proceed from its bottom into a series of coppers of different capacities, and arranged in the usual manner for evaporating cane juice; the pipe *f* which has a cock at *g* leads into copper *h*; in like manner *i* and *j* lead into *k*, *l* and *m* into *n*, *o* and *p* into *q*, and *r* and *s* into *t*. A sixth pipe *u* provided with a cock *v* leads into a cistern *w*.

The operation of this apparatus, most of our readers will fully understand without any explanation of it, as similar contrivances for various purposes have been applied, even since its first invention by Savery, we will therefore be as concise as possible in our exposition. Supposing it to be desired to transfer the principal part of the contents of the copper *h* into the copper *k*, the process is as follows; all the cocks being shut, open cocks *c* and *e*, when steam from the boiler a will flow through the pipe *b* into the vessel *d*, expelling the air it previously contained through *e*; and when the steam issues from the latter, it is to be closed, as well as the steam cock *c*; now open the cock *g*, when the pressure of the atmosphere on the surface of the liquid in *h*, will force it up the pipe *f* into the vessel *d*, in which a vacuum was effected by the condensation of the steam, and shut the cock *g* as soon as enough of the liquid has been raised. Next let the air into *d* through *e*, and open the cock *v* in the pipe *u*, when the liquid will be discharged from *d* into the receiver *w*. Having shut the cock *v*, proceed to remove the contents of the vessel *k*, by letting fresh steam into *d* to drive the air out at *e*; having shut *e*, open *j*, when such portion of the contents of *k* as may be required will be forced up the pipe *i* into *d*; the cock *j* must now be shut, when the contents of the vessel *w* may be run off through a spout into *k*; and during the operation we have described, the first vessel *h* should have been charged with fresh juice. In removing or transferring the contents of any of the other vessels, the process will of course be similar with respect to them in connection with the vacuum vessel *d* as with those already mentioned.

Although this apparatus may appear very ingenious and the process more elegant than the common mode of ladling the liquid from one copper to another, yet, we cannot discover why the whole affair might not be superseded by placing the coppers at different elevations, and allowing the liquid to *flow* from one into the other, especially as the lowest or last copper, is that under which the fire is placed; such an arrangement would likewise afford the most beneficial action of the heat, by the form which the flues would in consequence assume. We are sorry to add, that we cannot discover any utility in any part of the plans of the patentee, and we think he is badly advised in taking out so many patents for similar objects.

HEATING.—To A. M. Perkins, of Harper Street, Middlesex, Civil Engineer, a patent "for improvements in the apparatus for heating air in buildings, heating and evaporating fluids, and heating metals," was granted on the 30th of July, 1831, and the specification was enrolled on the 30th of January, 1832.

The medium proposed by this patentee for communicating the

heat of a fire to the air in buildings, to fluids for the purposes of evaporation, or to metals for copper-plate printers, is water, and this he heats in a series of tubes surrounding a furnace which may be varried in size according to the quantity of heat required. From the upper part of this tubular boiler a flow pipe conveys the heated water to the place where it is intended its heat shall be given out, where, having parted with the quantity of heat required, the water descends through a return pipe to the lower part of the boiler, and thus a constant circulation of the fluid is obtained. The patentee states, that the surface of the pipe giving out heat must be to the surface of the pipe receiving it as twenty to one, otherwise the pipes might be bust by the application of heat. To admit the expansion of the water Mr. Perkins proposes to place, in connexion with the highest part of of the pipes, a vertical cylinder of sufficient capacity to contain the increased bulk of water when it obtains its maximum heat; as the water cools it will descend, leaving the cylinder vacuous. The application and use of this cylinder seems to constitute the principal claim of the patentee. In the specification is described a method of fixing the different pieces of pipe together, which consists of an exterior fitting into an interior cone, which are brought together by means of screw bolts passing through two loose pieces which rest against shoulders or flanches cast upon the pipes near the ends which are to be fastened together. This method of joining pipes was however patented by the father of the present patentee, and described in the pages of our present series.

Mr. Perkins's plan of communicating heat to metal tablets for heating copper or steel plates in the process of printing, consists in making the hot water pipe pass between two plates placed horizontally to form the tablet, and then filling the spaces between the plates not occupied by the water pipe with lead, or some other metallic substance of easy fusion.

PAPER.—To J. Hall, the younger, of Dartford, Engineer, a patent "for improvements in machinery, and in the manufacture of paper," was granted on the 3rd of August, 1831, and the specification was enrolled in the Enrolment Office on the 31st of January, 1832.

The large elliptical vat iu which is placed the engine for washing the rags and reducing them to pulp, is divided into two compartments, by a longitudinal partition, not reaching however quite to either end of the vat. On one side of this partition the engine works, and on the other Mr. Hall proposes to place a cylindrical sieve to receive the mixture of rags and water in its

progress from one side of the engine round the partition to the other. This sieve is to be made of longitudinal bars of brass, or other suitable material, supported in their places by means of several hoops having arms extending from the axis on which the cylinder is turned. It is covered with a web of wire of appropriate fineness, to save the pulp and let the water pass through. The end of the cylinder next the partition is closed, and the end next the side of the vat is furnished with openings through which the dirty water passes into a pipe by which it makes its escape as the sieve revolves. The revolution of the sieve is produced by means of a pair of bevel wheels at the end of its axis, which connects with the prime mover in any convenient manner. The arrangement will be understood on reference to fig. 4, Pl. III.

[*We have postponed the account of several New Patents, due for insertion in the present number, until our next, to make room for Sir Anthony Carlisle's interesting Lecture.*]

PORTABLE AND EXPEDITIOUS HOT-AIR AND VAPOUR BATH.

By G. Desormeaux, Esq. (Surgeon) Islington.

It affords us peculiar satisfaction to lay before our reader the description of a very complete and judiciously constructed apparatus for bathing invalids in either heated air or steam; which has been liberally communicated to us by a gentleman of great skill and intelligence in the medical profession. We subjoin a copy of his communication, for which we think the public will stand much indebted to him.

Mr. Editor.

Sir,—If you should think the following particulars of an improved portable couch for communicating hot air or vapour to patients in an expeditious manner to be worth a place in your valuable pages, they are much at your service for the benefit of the community. I do not wish to take credit to myself for originality, my object having been to improve and concentrate the best parts of many inventions already before the public, and thereby render their medical application more efficacious.

In the sketch which I inclose, fig. 8 represents a perspective view of the couch in which most of the parts are brought into view, (some being left out to avoid confusion)—*a a* show the ends, *b b* the sides, and *c c* the bottom of the couch, which is divided into two equal parts as exhibited by the line *d d*, for the convenience of doubling over like a box, to contain the several appendages of the

apparatus when disconnected and not in use. The head and foot boards are kept in their position by eyes and wire bolts, of which there are several, to alter the length of the couch according to the stature of the patient; and when the couch is shut up, these boards are taken out and fit into the open end of the box. The legs *e e e* are screwed into the bottom, and are consequently removeable at pleasure, so that it may be placed upon a bed, sofa, or any convenient support; and this arrangement admits of its being placed upon wheels and springs, for the purpose of easy transport when desirable. It is provided with handles *f f f* (also removable by their sliding through staples), to enable it to be carried in the manner of a sedan chair, the weight of which it does not exceed.

The total length of the couch is six feet five inches, the breadth 22 inches; the depth is 12 inches at the head, and nine inches at the foot, to produce an agreeable or slightly inclined plane for the patient, who is supported by broad webbing stretched across the top of the box, as shewn at *g g g*; which is further strenthened by two longitudinal pieces of narrow webbing stitched to the former, but not introduced into the drawing; hot air or vapour is thus freely admitted to the *spine* of the patient; the upper surface of the body is also surrounded with the heated media by means of a thick woollen covering supported upon cradles or frame *h h h*, which are raised from the sides of the couch, and being jointed in the manner of a parallel rule, they may be shut down flush with the edge of the box when not in use. To prevent the cradles from collapsing by pressure, they are held by cross stays not shewn in the drawing.

The application of hot air is effected by a spirit lamp; that which I have used* is represented at fig. 4. It has four burners provided with the incombustible or wire wicks; the central aperture *i* is left open to admit the air to press upon the surface of the fluid; there is also a lateral tubular aperture *k* furnished with a cap, where the lamp is charged with the spirit, which cannot in consequence be supplied with it to too great a height, preventing the liability of the spirit boiling over, and taking fire in the stove. This lamp is put into a small cylindrical stove, such as is shewn by the sketch fig. 5, where it rests upon a perforated bottom or grating. A short pipe *l* is employed to conduct the heated vapour into the couch in the manner I will now describe. Along the bottom of the couch is a tin tube *p*, jointed in the middle, and raised about an inch by tin supporters; it is perforated throughout its length, on each side, by three rows of small holes about half an inch apart, and is connected

* Manufactured by Mr. King, of Hosier Lane, Snow Hill, from whom in the construction of this apparatus I have received several valuable suggestions.

to the hot air pipe *l* † (before described) in a straight ine when used in a room. But when it is intended to be used for conveying a patient to an hospital who may have fallen in the streets by an attack of spasmodic cholera, the stove is ts be slung underneath the couch, to be out of the way of the bearers, as partly shewn in fig. 3, where a double-elbowed pipe is employed for the purpos e.

In the application of steam and hot air together, the cover on the top of the furnace is removed, and the steam boiler represented at fig. 6 is placed therein, which is to be filled to the height of the try-cock *m* by pouring the water through a sunken valve at *n* ; *o* is the pipe for conducting the steam into the bath through the medium of a flexible tube.

In taking *a vapour bath only*, the hot-air pipe would be disconnected from the apparatus, and the hot air allowed to escape into the room, or up the chimney. On the end of the perforated tube *p* is then fixed a cap having a central hole to admit the end of the flexible tube, which then conducts the vapour into the couch beneath the patient.

A thermometer should accompany the apparatus for ascertaining the temperature of the bath, which is regulated by a damper in the conducting pipe, or in the door of the furnace.

In addition to the advantages already mentioned, I consider the apparatus to possess the following :

First—As a portable couch, which can be used by parishes, hot air may be applied instantaneously to the patient, which may be continued unremittingly during the time he is being carried to his designation.

Second—In the effectual application of heat to the *spine*, which in all other apparatus that I have hitherto seen has been omitted.

Third—In the facility of rendering the operation of the vapour continuous by supplying the water through the valve (which is lifted by a string at pleasure), and of regulating the heat to any required temperature.

Fourth—In the vapour bath being available without the coueh by conducting the steam pipe under a chair enveloped with a blanket or other suitable covering.

I am, Sir, your obedient Servant,

3, *Brunswick Terrace*, D. DESORMEAUX.
Near Cloudesley Square, *Islington*.
22nd Feb. 1832.

† It is better that this pipe be covered with a non-conducting substance, such as wood, to prevent burning the clothes that may lie over it.

SIR ANTHONY CARLISLE ON CHOLERA MORBUS.

THE deep interest excited throughout the civilized world respecting the nature and treatment of the above-mentioned disease, induced us to request Sir Anthony Carlisle would favour us with his notes of the Public Lecture given by him on the subject in the Theatre of the London Mechanics' Institution, on the 16th of November last. Sir Anthony having had the kindness to comply with our request, it is with much satisfaction we now lay the valuable document in question before our readers, together with a short " preface" which the Lecturer thought proper to add by way of explanation. It is no more than justice to remark, that all the statements and predictions of Sir A. Carlisle in November last have been completely fulfilled.

PREFACE.

THE following Discourse was hastily composed in familiar language for the purpose of delivery at the London Mechanics' Institution. I was urged to the task by the terrific and extraordinary expositions made by the Board of Health under the exclusive authority of Government, and sanctioned by high professional names. Since the public reading of my discourse, it appears that the first constituted Board of Health has either ceased to act, or it has been superseded by a more promising Board, called the Central Board of Health.

This approved change, together with the institution of a City of London Board of Health, equally deserving the public confidence, might seem to render my present observations unnecessary; but the various printed reports of my Lecture are so incorrect, and, in some instances, so unsatisfactory to myself, that I have felt obliged to give it to the press in its genuine form. Although many of the scientific and professional views herein announced may be known to my brethren, yet some of them are new, and perhaps of practical value, If, however, my present sacrifices tend to promote scientific inquiries, and afford hints to the few philosophers who practise the healing art, I shall be rewarded.*

6, *Langham Place*, ANTHONY CARLISLE.
Nov. 29, 1831.

ALTHOUGH I have been accustomed to extempore speaking, matured years, have induced me to think that oratory is unsuited to appeals to the understanding, and upon this occasion eloquence would rather tend to excite the passions than to aid your reason.

It cannot be expected, that I shall attempt to give this intel-

* The liberal reader may be disposed to excuse the numerous errors of diction, and the irregular order of my arrangements, when he is told that during the delivery of the Discourse, every section of it was elucidated by extempore anecdotes, purposely intended to enliven the reading of several abstruse subjects.

ligent audience a popular exposition of the healing art; indeed, I consider the pretences to make every man his own doctor, much the same as if a member of this institution should undertake to teach every man to be his own watch maker.

From the first institution of medicine as a profession, (and which is generally assigned to the ancient Greeks) the art of healing, has embraced several branches of knowledge, and these have been progressively improving to the present day. An acquaintance with the mechanism of the human body (termed anatomy), has ever been regarded as the principal and most essential foundation of medical science, because it displays the sources and the seats of diseases; it exposes the changes of structure induced by several maladies; and the damages occasioned by violence; but until the natural uses of the different parts of the human body had been clearly proved, medical men could not determine the necessary connection between the mechanical textures of the human body and their respective offices; and it would be still more absurd for a man to pretend to reason upon the disordered actions of the living frame unless he had first become intimately and minutely acquainted with the natural structure and chemical properties of every part and parcel of the human solids and fluids. These particulars are not however to be found in Greek or Roman authors; for until the free co-operation of unfettered minds after the reform of religious thraldom, and the general spread of translations, and of critical discussion through the press after the introduction of printing, the healing art was restricted for many centuries to a few classic scholars, without any remarkable improvements or scientific discoveries.—A single illustration may serve to show the insufficiency of ancient learning as to anatomy, the main source of medical knowledge. Neither the Greeks, the Romans, nor the Medico-Theologians of the dark ages, had any idea of the circulation of the blood; on the contrary, they entertained practically erroneous and absurd notions concerning the offices of the heart, and the different kinds of blood vessels, these subjects being unknown, until Dr. Harvey, one of the physicians to Charles the First, demonstrated them. Before that period the healing art was little better than the domestic medicine of our modern old ladies, who piously give reputed drugs at random for diseases which they are not qualified to understand, or even to distinguish from those of opposite character. I am induced to urge these points, because a mystical domination still continues among doctors of mere learning in favour of classic authorities, to the manifest injury of medical science. I do not desire to disparage the value of classic learning as a mine of derivations of words; and as containing the earliest examples of human intelligence; but I should act falsely to the convictions of forty years of practical experience, if out of courtesy I shonld pretend to admit either the theories or the practice of Greek physicians or surgeons, on a parallel with the advancing

philosophical reasonings which now guide the scientific members of our art. One palpable instance may be enough to prove this assertion—the healing of a cut wound is at this day as well understood as the gluing of two pieces of board; all the natural efforts of the damaged parts are clearly known, the vessels and materials employed have been demonstrated, and all the causes, whether constitutional or local, which tend to favour or to spoil the union of the divided parts, have been scientifically explained; but this knowledge, now apparently so simple and true, is of modern date, not half a century old, and not yet spread over Europe. Our predecessors imagined that every kind of healing was effected by special drugs, and they employed mundifiers, incarnators, digestors, and cicatrizors, as they termed certain medicines, to effect the processes which nature alone performs.

If surgeons generally have got rid of those superstitions, I fear that other branches of the art are not in all respects equally advanced. It is still to be lamented that the modern doctrines, which assume to explain the nature and causes of diseases, are a jumble of disgraceful contradictions, so much so that they are incomparably less logical than the theories of chemistry, and less exactly defined than many inferior branches of natural knowledge. Hence it arises that regularly educated practitioners are in many cases superseded by ignorant quacks. This want of general confidence is partly imputable to the state of the profession itself, and partly to the public deficiency of information. The blameable conduct of the members of the profession, is their continued adherence to mystery and to concealment of their remedies, a practice which places the desperate pretender on a level with the doctor who virtually prescribes secret means. This crying sin against common sense and candour, was removed in France by one of the laws of Napoleon, which forbids the writing of medical prescriptions in Latin, or under the disguise of mystical signs or abbreviations.

Another impediment to the public confidence in regularly educated medical men, arises out of the frequent vagaries of fashion, and of undue fame assigned to persons of slender natural talents, and with no pretensions to scientific attainments; to men of little experience and of small repute among their brethren. Such instances of worldly favour create a foolish belief that medical or surgical skill may be a supernatural gift, and accordingly the same reliance is placed upon daring adventurers in cases of life and death, as should be exclusively given to the adopted sages and judges of the profession.

The want of a presiding philosophy at the head of the healing art has been wofully evinced during the short history of vaccination. A discovery which might have been a comfortable assurance against the terrors of the small-pox, if it had been directed by science, and by temperate reasoning; but under violent unfounded assertions, and the legalized edicts of medical fanatics, the subject has fallen into popular uncertainty, and the public

faith in medical judgment has become unsteady. Unfortunately, the two extreme ends of our community greatly resemble each other, since their follies and their vices are alike; the highest class thinking themselves above responsibility, and the lowest despair of meeting with moral consideration.

If medicine could have been established upon exact recorded precedents, and all succeeding cases had been fixed by the laws of nature precisely similar, then, indeed, might a laborious student, aided by practical observations, become in early life a master; but it is far different: for the evidences of diseases, and even of mechanical damages in the human frame are often obscurely marked, and mistakes in either are liable to be fatal. The organic capacities of the senses of every distinct man differ as much as the capacity to assemble and assort observations, and to draw sound judgments from them. For human reason is not reducible to certainty like the arithmetic computations of a sliding rule—under such uncertainties, and with no other selection than the choice of parents, it is not surprising that the officers of health differ so much in opinion and in practice; science alone ought therefore to rule their conduct, and afford general principles, while an enlightened public discriminates their several degrees of merit, and confers the proper station upon each practitioner. Assuming then that the healing art may be in many instances reduced to ordinary reasoning, I shall now proceed with my proposed subject.

Diseases are deviations from the healthful or natural operations of the living body, and the most destructive kinds which spread through large communities are called pestilential. I should trespass on your attention unworthily, if I should exhibit the conflicting and rancorous differences which now prevail respecting infectious and non-infectious diseases. It is sufficient for those who wish to be guided by common sense, to be told, that the different species of pestilence appear under more or less of malignity according to circumstances, which human prudence may often control; and those facts belong to our present purpose. I speak with confidence, supported by long and varied experience, and under scientific authority, when I assert that every kind of infectious pestilence varies in its degree of malignity according to known rules, and that the worst of them continue but a short time; either from a progressing dilution of the infectious matter, or from the bodies of persons exposed to the infection being gradually inured to its action, until they cease to be capable of being impregnated, as it happens to medical attendants and to nurses. Many years ago, a good old nurse at the Westminster Hospital told me that she had during forty years of service, attended and laid out more than a thousand patients who had died of putrid fever, and although many of the visiting pupils had caught that disease, she herself had not been once infected. Had it not been for these providential ordinations, every malignant infectious disease would spread universally,

and prove universally fatal; for it is right on our part to acknowledge, that we do not possess any curative drugs, or special antidotes for many of those diseases. For example, in the small-pox, the measles, and in putrid fevers, we have no antidotes: these diseases run their course, while we watch the special distresses of nature, and afford the aids which experience and science suggest.

It is highly worthy of notice, that persons constantly employed as nightmen or as labourers in the most filthy sewers, are seldom attacked with those diseases which occasional exposure to putrid substances frequently produce.*

The public are grossly misled by words which often impute properties to things not founded in truth; thus the bleaching liquid called chloride of lime is falsely called disinfecting, whereas it only stops or destroys animal putrefactions.

There is a curious coincidence respecting two diseases which have no natural cure, and for these art has supplied curative antidotes, I mean agues, which are cured by Peruvian bark, and a nameless disease curable by mercury. I wish I could say the same in that most horrible and incurable disease, canine madness, which seems to have no natural termination but in death—even that frightful malady requires a given quantity of infectious matter, and a given time to work, in order to generate its terrible venom; for if the bitten part be covered by any garment, the infection seldom takes effect.

There are several means quite within your power which assuredly arrest the spreading of pestilential diseases, abate their violence, and strengthen the bodies of men to better endure their effects; and my present endeavour is designed to awaken your attention, and to convince you of the reasonableness of those various measures.

Modern chemistry has abundantly shown the grosser constituent elements of compound substances, and those of the mineral kingdom are found to be in many instances united in fixed proportions, but not so the temporary and frail compounds of living creatures. Their especial materials are provided to suit the continued changes of growth, restoration of decays, or damages; and to supply the waste accompanying those complex organic offices. Such unstable assortments of transitory materials as those which form the wonderful living and thinking automaton man, are placed in many respects above the reach of our philosophy; but it does not follow that because our pride is balked of soaring to the knowledge of the Supreme, that we should slothfully or peevishly shut our understandings against the partial and practical attainments which the evidences of nature and improving human ingenuity afford. It is upon this plea that I desire the abolition of medical mystery, of medical classic superstition, and of metaphysical jargon; and I know not where or how I can better begin

* I have lately obtained a valuable and authentic proof of this assertion, which it is not expedient at this moment to publish.

to work, than in assemblies of men possessing strong minds united to strong bodies; men capable of comprehending the clear and solid truths of scientific demonstration and of scientific logic; for I am convinced the hour is arrived to commence the overthrow of medical imposture of every kind, and for establishing the God-like vocation of healing on the safe and sure foundation of the exact sciences.

It is evident that every kind of infectious matter may exist in more or less degrees of intensity, or concentration; and that by *excessive* dilution the most malignant of the pestilent poisons may be rendered harmless; thus it happens that those infections which spread through the medium of the air of the atmosphere are gradually exhausted and lost, for if an infinitely small quantity of any such poisons had been capable of infecting human beings, we should have no security against their universal prevalence whenever a pestilent malady occurred—But the proof of my assumption is determined by the degrees of violence in all infections, being in proportion to the intensity, the quantity, or the duration of the infecting cause, and upon this theory all the advantages of inoculation for the small pox stood, for in that process the minutest effective quantity of matter was employed, instead of taking the chance of an indefinite exposure to the infectious matter in what was called the natural way. It is worthy of notice, that every animal poison is propagated by producing its own kind under the effects of special inflammations; thus, a tenth of a grain of small-pox matter introduced into the living frame by inoculation may create several thousand pock spots, each of them holding more than a grain of similar virus. An analogous fact is observable in the fermentation of malt liquors; for a definite small quantity, say five grains, of yeast, will produce no effect upon a barrel of gyle, but five ounces will raise the fermentation, and create tenfold of its own kind into yeast. Thus also in the ague fever of Walcheron, those persons who were placed nearest the infecting ditches, or who remained for the longest time so exposed, were the marked victims of that malady, although the men placed only a few hundred yards more distant from the infecting vapours of those waters were exempt. In the last notorious gaol fever of Newgate, the uninfected prisoners brought the fever into the court and communicated the disease during their trials fatally to many of the officers; such was its intense malignity upon strangers, although inoffensive to the persons confined within its very source.

Some years ago, the infection of measles was carried from the family of a laundress living a few miles distant, to several families of my acquaintance, in the returned clean linen; for the carrier never entered her doors. In like manner I have known many instances of small pox and scarlet fever conveyed from house to house by medical attedants, but seldom so transmitted unless the disease raged severely at the place from whence it was thus conveyed.

The authentic histories of agues, show their dependance on the vapours arising from decaying vegetables in still waters, for the mere rotting of vegetable substances in a kitchen garden or in a farm yard never produce agues, and at a moderate distance from the place of those rank dissolutions of water plants, the human frame is exempt. Another still more striking circumstance is the season of the year in this climate, and the changes of rainy and dry whether in hot climates, when those fevers occur, they being notoriously connected with the decay of water plants.

In putrid fevers the cause of their origin may be generally traced to animal putridity, to the want of personal cleanliness, or to the want of fresh air in close dwellings, as in jails. In fact it appears demonstrable to all men of unperverted sense, that agues originate from a peculiar vegetable vapour, and that they are not transferable from man to man, while putrid fevers arise from animal putridity, and the person so disordered may spread the infection personally without limits, provided the victim be sufficiently exposed to an intense degree of the cause, or be for a certain length of time under its influence.

The following statement may serve to show the irregularity with which malignant infections are propagated. My late worthy colleague Mr. Morel, had the charge of a small detached plague hospital during the stay of the English army at Alexandria and Rosetta. One day his assistant-surgeon, together with two commissioned officers dined together in the same tent; they all partook of a rabbit soup served at two o'clock, and were consoled by observing that the cooking resembled their national fare. While sitting at table the serjeant announced that his wife who had cooked the dinner was taken suddenly ill; the two surgeons directly visited her, and discovered that she was unquestionably attacked with the plague. She was forthwith carried away to the distance of a few hundred yards, and placed on a frame under an awning. Medicines and other suitable necessaries were placed by her side, and the dismayed officers awaited the event. While it was yet day-light, they beheld the appointed attendants digging the sand for her interment.—The whole party passed the night and the following day in dread of the pest, but not one person received the infection. Upon inquiry it was found that the huckster who brought the rabbits for sale had buried his wife two days before, she having died of the plague.

Although agues and putrid fevers originate from different sources, each class assumes different degrees of severity according to the intensity of the infection, the state of health of those who are attacked, and to their previous habits; hence agues are more violent and more difficult of cure in persons who are poorly fed, or who live chiefly upon vegetables; while putrid fevers, including the plague and yellow fever, are most destructive to those who live grossly upon unwholesome animal food. These are not the fleeting vagaries of medical imaginations, but the

results of notorious experience and of public conviction, and the evidences have been adopted both as preventives, moderators, and remedies.

In some of the campaigns of the French armies during the last war, the soldiers most exposed to agues were provided with strong portable animal jellies for soups, which proved, in many cases, even curative. Up the Mediterranean when the plague is most liable to occur, the people abstain from fish, eggs, milk, and butter, and live chiefly upon corn and fruit diets; this regimen being found to abate the tendency to receive the plague, and even to diminish the averages of its mortality. It may be here remarked, that we do possess medicinal remedies for agues, but none for putrid fevers.—Those curious infectious diseases called small-pox, measles, and scarlet fever, appear to have originated in some chance medley of diseased humours, which is now utterly inexplicable; they seem to be of no great antiquity, and were unknown to the inhabitants of America when that quarter of the world had its first intercourse with Europe. I have already said that the medical art does not supply any curative drug for the small-pox, since that disease will have its course; but the fever which accompanies the small-pox may be often controlled by medical skill. In Spain it is customary to open all the pock spots with a needle as soon as they begin to show a contained fluid, and this is constantly repeated, so as to let out the offending matter during the whole progress of the disease. The universal conviction among Spaniards is, that such repeated discharges from the pock spots essentially assuages the fever, and prevents the disfiguring pits on the skin. There are striking differences between small-pox and measles, although each produces constitutional fever. The small-pox when taken accidentally is commonly the more dangerous as life advances, while the reverse attaches to measles. During the fever of small-pox, fresh air, and even cool air, is beneficial; whereas in the measles the fever frequently attacks the lungs, and on that account in cold weather it is proper to keep those affected by that malady in warm rooms. Now, although the infectious matters of small-pox or measles do not seem to be aggravated or augmented by outward circumstances, both diseases are most dangerous to those who are ill fed, who live in unhealthy places, or whose constitutions are disordered.

In putrid fevers the malady is distinctly aggravated by putrid air, and agues are more difficult of cure in the swampy regions where they originate: these known facts lead to practical applications on the serious measures to be hereafter submitted for the prevention or the abatement of pestilential cholera. Without entering into the prevalent disputes about contagion, or assuming that my views are better than those of other men, I wish to draw your attention to a few leading points. The air which we breathe, and by which we every moment exist, is capable of many admixtures, its variations in temperature, and in degrees of moisture,

manifestly influence human health; but the contaminating additions of noxious vapours are even still more injurious. The sense of smell is directly appointed to warn us against the most common stenches—I mean putrefactions, which we instinctively abhor; but some vapours more immediately destructive, do not equally affront the senses, as the carbonic acid gas. Putrid vapours are, however, spontaneous and natural products, whereas the generation of carbonic acid gas is artificial, and nature has not provided us with safeguards against the ills of artificial creation: here we are compelled to seek remedies from science, and happily thus far the useful discoveries of science have kept pace with the evils produced by art in the highest states of civilization. Of the lingering adhesion of putrid vapours we have abundant proofs in the long continued offensiveness of garments, only exposed for a few minutes in a filthy place, in the smell of a stable, of hay, or tobacco, remaining in our clothes, and all the quarantine fumigations and airings of supposed infected substances are established upon these notorious evidences. That there are differences in the progress of putrefactive decompositions is obvious, because every putrefaction does not create the same infection. For instance, a mortifying sore sometimes occurs in badly ventilated hospitals; but it does not arise from ordinary putrescence, it seems rather to depend on morbid chemistry.

A singular modified fever and sore throat lately happened in a family who were attended by a professional friend; it raged severely throughout the inhabitants of that house, and destroyed two children; but it spread no further. Upon carefully searching the under-ground offices, a large basket of decayed onions was found in an outer cellar, which yielded a most loathsome smell, and on their removal the pestilence ceased.

If I should seem to be proceeding in a tedious way, it is because I am anxious to make you acquainted with the reasons for adopting certain measures, and these must be implanted in your minds by various circumstantial illustrations. I therefore again desire to impress you with the leading points of this serious subject, viz. that all pestilential diseases vary in danger according to the states of health of their victims, and the intensity or condensation, or quantity, as it were of the contagious matter.

The sea scurvy, formerly a destructive pest to mariners in long voyages, has now become rationally understood. It arose from corrupted pickled beef and pork, foul water, and want of cleanliness. The disease seems to be a gradual putrescence of the living body, and its ravages have been notoriously fatal to those sailors who indulged in spirituous liquors; it also occurs from similar causes in London. It is cured as if through a charm; by taking the juice of a few oranges or lemons. Under the modern discipline of ventilation between decks, of personal cleanliness, and of ocassional supplies of fresh vegetables or vegetable acids, that malady, so destructive in Lord Anson's time, is now

hardly known in the longest voyages. One of my most intelligent pupils settled in Warwickshire, some years ago came to London in great distress about a frightful series of deaths in a farm house. The farmer, his wife, and two inmates all died within a fortnight of a most malignant putrid fever. His son with a wife and three children took the farm, they immediately had the disease and all but one perished. A stranger and two servants then occupied the house, they also died within a few weeks. The horrid dwelling was closed, and at my request a strict search was instituted to discover the cause. All the likely sources of offensiveness were examined, but nothing remarkable found, until my scholar's attention was drawn to an old wooden vat containing stale pickled pork, which was known to have been resupplied without cleansing for many succeeding years. The vat still contained some of the old pickle; it had a very peculiar stench, not putrid, but sickening; the vessel was removed and buried, the house was lime washed, and a new tenant with his family then ventured to occupy the deserted farm, and lived there for many years in good health. Another anecdote may suffice to shew the noxious effects of corrupted food. The late Sir Humphery Davy while residing at the Royal Institution had a putrid fever, I attended him, and he was rapidly recovering, when some busy friend induced him to eat freely of stale grouse, his disease immediately returned under a threatning aspect, and he narrowly escaped.

It seems that both the vapours arising from animal putrefactions and inoculations with putrid substances are alike injurious; because a cut received during the dissection of diseased bodies mostly occasions dangerous effects, and generally produces putrid fever; in like manner the stench of those places often infects strangers with putrid fever, while the generality of fresh students have bowel disorders, until they become used to the offensive vapours; they at first betray uneasiness by frequent unconscious spitting, as if the liquids of the mouth so impoisoned were instinctively detected.

I shall now advance to the particular subject of our present anxieties, the pestilential cholera, which I do not regard with all the horrors so injudicously heaped upon it by authority. Admitting myself to be in the same predicament with those who form the public boards, I do not on that account consider any of us incompetent to judge of the nature of this foreign malady, or unfit to direct its management; for Indian cholera resembles common and well known disorders of the same bodily organs; indeed, I have myself twice suffered the common cholera, attended in degree by all the effects belonging to the pestilential distemper, and not without danger. In one instance I examined and found the discharged fluid to be serum, with some addition of superfluous water, and containing flakes of fibrin. The whey-like discharges coagulated freely in a spoon held over a lamp, but I was too unwell to test the fluid for either free acid or alkali. The properties of the

peculiar venom which occasions Indian cholera is unknown, otherwise a chemical antidote might have been discovered, and I am sorry to say, that the pretended remedies, such as an almost poisonous dose of 20 grains of calomel, or a teaspoonful of oil of cloves, are desperate means, not adviseable upon any rational principles, of no assured benefit, and therefore I agree with numerous others as to their ineligibility.

In order that my opinions and advice may be reduced to reason and common sense, I will endeavour to express them shortly, and without the perplexity of professional words.

Every species of cholera is denoted by vomiting and excessive discharges from the bowels; showing that the stomach and the intestines are the seats of the malady. Many drugs which specially irritate the stomach or bowels produce similar effects, such as the emetic root called ipecachuana, and the purgative elaterium, and their respective vomiting or cathartic effects, correspond with the doses given: it may be further noted that an excessive purgative medicine often kills weak persons. Improper diet, or food rendered indigestible, by drinking fermented liquors to excess upon a full stomach, may produce a temporary cholera; or the stoppage of sweating by sudden chills may drive the blood inward, and occasion an immediate flow of liquid into the bowels, for the inside of the bowels, of the lungs, and the kidneys resemble the outer skin of the body in several of their living offices, especially in being the common outlets for perspiration, evaporation by breathing, and filtration by urine, of the redundant water and spoiled materials of the blood.

The life of man depends from hour to hour, upon three principal sources—viz. the 1st, free breathing of the air around us, for if the breathing be stopped, or the chemical properties of the air be noxious, death soon follows. 2ndly. On the continuous circulation of the blood, and there are three essential causes of that motion; 1st, the muscular action of the heart, which is the mechanical engine appointed to force it along the vessels; but the heart will not act unless it be stimulated by blood chemically changed by breathing proper air; for if pure carbonic acid gas be breathed, the heart stops instantly. A second cause of the heart's action is the influence of the brain; since, if its communication with the heart is cut off by dividing the spinal marrow, called pithing, or if the brain itself be violently damaged, death speedily follows. 3rdly. The heart may stop from the want of a sufficient volume of blood to act upon, as it happens in the deadly bleeding of slaughtered animals. It may be further observed, that the living dominion of the brain and its governing powers depend on the supply of blood, for if the blood ceases to flow only for a few seconds, as in fainting, the mind becomes unconscious, the heart stops, and the breathing is hardly perceptible.

The application of all these facts will soon appear, if I should have succeeded in giving you clear ideas. For every respectable

medical authority now acknowledges that the first treatment of pestilential cholera is much within the grasp of unprofessional persons; indeed, the sudden dangerous violence of its attack often prevents immediate medical aid:—let us then inquire into the rational causes of death in every species of cholera; for I maintain that the causes are alike. The most malignant attacks of cholera, and those suddenly destructive, vent their rage upon the stomach, similarly to surfeits from unwholesome food, such as the stale shell fish called mussels; and if in any of those cases the impoisonment of the stomach should quickly destroy its muscular ability to reject its noxious contents, vomits seldom operate, and the event is fatal. This form of attack, however, is not the most common; it preferably seizes upon those who are in bad health from previous habits of intemperance, from destitution of wholesome diet, or uncleanliness. Medical men assume to distinguish three distinct kinds of flux from the bowels: an excessive laxity without fever, called diarrhea; a malignant flux attended with fever, and often with discharges of blood, termed malignant or camp dysentery, a disease which has often destroyed more soldiers than the sword or bullet; and the common cholera morbus, which varies in its fatality with climate, previous states of health, and local causes—all these maladies are so closely allied that they rather seem to vary in degree, and in their causes, than to be really different diseases. The most rational as well as the most successful treatment of them all is nearly the same. Every sort of flux depends on irritation of the stomach or bowels, or both; and two kinds may be properly regarded as infectious; but as I have already stated the spread of those infections is intimately connected with their local concentration, or intensity, with the condition of the person attacked; and I wish to believe that the present violent discords among my brethren as to infection and non-infection, arise from the desire of zealots to come at positive and perfect conclusions, which the vicissitudes and infirmities of our minds deny. A little charity for each other's weaknesses and different attainments, and a more strict observance of exact philosophic reasoning, from general evidence, without demanding universal concurrence, (which never happens), might do honour to our perilous and most responsible vocation. But to return to the immediate subject.—The pestilential cholera is unquestionably owing to an unknown special poison or irritant, and that cause produces more violent and more dangerous effects than the better known and grosser causes of the other fluxes termed diarrhea, common cholera, and dysentery. The manner in which the material cause of pestilential cholera gets into the human body is apparently unintelligible: the most obvious way is by the mouth in the first instance; for the spittle is exposed to every vapour that is breathed, and we know that all watery liquids are capable of being impregnated with vapours. It is therefore no great stretch of probability to

say, that the common inroad of the infectious vapour of pestilential cholera is its descent along with the spittle into the stomach. I am aware that numberless physical and even metaphysical objections may be raised against this assumption, because it is too plain for medical mystics; but if it convinces your reason, and leads to common sense preventives, I shall have effected my purpose. Although many pestilent diseases may be reasonably considered to be transmitted in a state of vapour through the medium of the air which we breath, yet it may not invariably happen that the poisonous vapour always enters the human body through one and the same channel; for example, the plague and putrid fevers most probably enter by the lungs, and there infect the blood; while the vapour of pestilent cholera may pass directly into the stomach after impregnating the spittle. As I canuot foresee any harm from the adoption of this opinion, because it brings us more directly and more plainly to the knowledge of cholera, and leads to a natural explanation of a sufficient cause for all the effects of that malady, and for its frequent fatality, I will venture to add, that such a reasonable view may be safely confided in by the public.

That every kind of vomiting and bowel flux depends on irritation of the stomach and bowels is proved by the known effects of vomiting and purging drugs, which however act variously; some purgatives irritate the muscular coverings of the intestines, and thus cause them to force out their contents more rapidly than is natural. Some vex and irritate the exposed open ends of numberless small colourless blood vessels which belong to the linings of the intestines, and thus occasion an excessive flow of liquid into the bowels, in the same manner as the sweat flows out of the pores of the skin. In both cases the discharged liquids are derived from the circulating blood: but here it becomes needful to describe briefly the different gross elements which form the compound fluid called blood. When blood is drawn from the living frame it presently becomes a solid firm jelly, which is termed its coagulation; within a few hours the congealed mass gradually parts into two portions, a liquid called serum, like whey; and a red coagulum—this last however consists of two distinct substances, the colouring matter being merely entangled in the congealed mass, and consisting of minute red particles; the congealed part is called fibrin, because it assumes a thready texture. The entire blood contains the raw materials for the growth, the repairs, and the natural purification of the living body—and the proportions of its elements are continually varying under every meal of food and drink, and under the appointed purifying discharges, such as the urine.

The pestilential cholera, if it does not kill at the onset, becomes a drain from the volume of the circulating life stream; but the peculiar irritation of the bowels only strains off the serum or wheyey portion of the blood, together with the super-

fluous water; whereas in the malignant camp dysentery, which is connected with putrefaction, or accompanied by putrid fever, a larger class of blood vessels give way, and the whole compound of the coloured blood is poured out and copiously discharged from the bowels—hence it is termed bloody flux. Now although the offices of life admit of a greater diminution from the serum of the blood than of its gross bulk, because the animal machinery is habituated, as I have stated, to changes in the comparative proportion of the serum; yet an excessive and sudden drainage of the serum, without compensation by drinking, destroys life as effectually as bleeding from the common stock. Unfortunately in malignant cholera the stomach rejects the proffered supplies of drink, and if not, the intestines hurry their liquid contents through the body, so as to prevent any addition to the blood by the appointed vessels called the absorbents.

These complex evidences constitute our grand medical difficulties; for if the volume of liquid blood be suddenly and excessively reduced, without the power to replace it, the smaller and more remote blood vessels are emptied, the limbs become shrivelled, and the animal heat which mainly depends on a full and free circulation of the blood, is abated; the heart acts languid from the want of sufficient distention, and the offices of life dependant on the natural circulation of the blood, and on respiration, either cease or become defective.

This general view is remarkably exemplified in cholera; for the urine and perspiration nearly stop, and the liver falls short of its raw material the blood, because it is carried away by the wasting pipes of the intestines. In fact, that great laboratory for the bile, the liver, the natural stimulant of the bowels, strikes work.

This rapid sketch expresses my long deliberated notions upon the causes of coldness in the limbs, of the colourless discharges from the bowels, of the final sinking of all the living powers; and I believe that it is sufficient to account for the fatal results of this pestilent malady.

As to the reported terrific pains in cholera, I regard them as extravagant representations, and most injudiciously exhibited before the public. Providence has with infinite tenderness for our bodily miseries, ordained that the worst of human pains have limits; for either we speedily sink under them, or the capability to feel them abates as we approach to extinction. These facts are notorious in extensive scalds and burns, in the punishment of flogging, and in long continued desperate surgical operations, perhaps sometimes unjustifiable.

The anatomical examinations of the cholera sufferers after death affords no satisfaction; indeed the previous living evidences suffice to account for the event without adding offensive insults to prostrate misery. The only discovery arising from dissection might have been foreseen, viz. the reduced quantity of the blood, its assuming an uncommonly deep colour, and being imperfectly

congealed, all of them depending on the before known drainage of the serum and coagulating material from the mass of blood. But I will go further and say, that the modern flippancy and indecency with which those examinations are conducted, seldom advance medical science, for they generally display the incurable ravages of diseases already perfectly well known; and we have ample proofs that the frequency of the irreverent exposures of our mortal remains, render those operators callous, and subdue the best natural and religious safeguards of human life.

In each distinct kind of bowel flux the disorderly occurrences which we call symptoms vary in quantity and duration, and the danger to life vibrates according to the violence of these symptoms and the constitutional strength of the sufferer.

If, as I have already insisted, the manifest cause of slow death in cholera, be the sudden or continued loss of one essential portion of the blood called serum, and that the diseased flux depends on an impoisoned irritation of the stomach and bowels, then the rational common sense preventives, palliatives and remedies, are consequently apparent to every man's understanding.

The preventives are to be found in those abatements of communication which experience has shown to be adequate to stop or delay infectious vapours, until their inveteracy is lost, or so far diluted, as to be harmless; for it is certain that the infectious material of human diseases is of unstable character, and that every species of such matter loses energy by being stagnant, by dilution, or by extensive diffusion. These points have been abundantly proved in the history of vaccination, and Dr. Wm. Henry, of Manchester, has just published some truly philosophical experiments upon dried vaccine matter, by which he has shown that it utterly loses its power to infect after being exposed for two hours in air heated to 150° of Fahrenheit's thermometer, yet it retains its full energies after the same length of exposure to a temperature of only 120°. Probably, however, the analogy does not extend to vapours and to gaseous products. It should be remembered, that the putrefactive decomposition of animal substances is not superseded by exposure to the temperature of boiling water, as every cook well knows, and so likewise in roasting a haunch of over kept venison at a much higher temperature.

As to the effectiveness of local quarantine barriers in great cities, I not only despair of them as a preventive, but I dread their rigorous application; for if the attempt to imprison the cholera families in their own houses, or to commit them forcibly to lazarettos, or hospital prisons, so lately raised insurrections in the military governed cities of Russia, Prussia and Austria, I cannot see how that system can be practised in the free cities of England. Let us keep in mind, that hoards of men become mad and ungovernable, when pressed to desperation by fear; and I beseech you to be assured that your mutual safety and common welfare depend on steadily maintaining that rational calmness,

which alone gives courage, and presence of mind, in the hour of danger. If as it is asserted on strong and rational authority, the pestilent cholera can travel on the wings of the air, and that one preventive caution is to keep to windward; how can we expect to confine it by iron bars and sealed up doors? Alas! you will in vain flee from Wapping to Westminster in a westerly breeze, for within an hour the direction of the gale may be reversed. Still, however, strong preventive cautions should be strictly recommended, such as free ventilation of the infected houses, and the keeping idle visitors from the constant attendants on the infected; and here some practical good may be gained from the obdurate doctrines of non-infection; for unquestionably the pestilent cholera is far from being universally contagious, since those who are urged by their kind duties to be the most exposed, very generally go free.

The next important preventive safeguard is to be expected from temperance and wholesome appropriate diet; for drunkenness and gluttony have ever been considered ruinous during pestilences of all kinds, and they were known to be the provoking causes of cholera diseases long before the date of Greek writings on physic. The author of Ecclesiasticus says, "Sound sleep " cometh of moderate eating, he riseth early, and his wits are " with him; but the pain of watching and choler, and pangs of " the belly, are with an insatiable man."—And again, " Be not " unsatiable in any dainty thing, nor too greedy upon meats."— " For excess of meats bringeth sickness, and surfeiting will turn " to choler."—" By surfeiting have many perished, but he that " taketh heed prolongeth his life." Chap. xxxi. and xxxvii.—

The subject of dietetic regimen has engaged much of my professional attention, and I have for thirty years published, taught, and practically enforced the same rules of living as those recommended by the City of London Board of Health. I therefore refer you to those rules, with only the addition of a few objectionable articles, viz. shell fish, herrings, sprats, makarel, pork, veal, fruits of all kinds, raw onions, and other uncooked vegetables. Dietetics are however only applicable as preventives against the virulence of cholera, and as soothing moderators of disorderly states which render the attacks of cholera more dangerous; but it cannot be reasonably expected that any kind of diet will stop the infection of cholera, any more than it would the infections of small-pox or measles; this rule is, however, not applicable to diseases wholly occasioned by putridity, such as putrid fevers, for in them every putrid or putrescible accession becomes an addition in kind to the disordered body.

As to the dietetic treatment of persons actually invaded by cholera, it is to be rationally inferred from the preceding observations. I wish however to call your attention to the present very successful practice of the Parisian officers of health in their public hospitals. They gave no medicine in common cholera

excepting a few drops of laudanum whenever the sickness and griping demand that soothing drug: their common rule is to give abundantly of mucilaginous drinks, such as warm gum water and mallow tea, and their nurses are directed to apportion the quantity and frequency of those drinks to the bowel discharges. In this way of proceeding the success of the French exceeds that of our more complex exhibition of drugs. There is a striking fact connected with drinking diluted saline waters, such as those of Cheltenham, for they merely rince out the bowels without making any demand on the serum of the blood, hence many old and diseased persons drink those waters daily without becoming weaker.

To conclude. The pestilent cholera assumes two shades or degrees like common cholera—the one having a sudden and violent career, the other of slower progress and less malignant. The disease does not pass through regular stages like the small-pox, but it may cease at any period. In the rapid or acute form, the disease vents its rage principally on the stomach; in the milder or slower progress it endangers existence by draining away the more liquid parts of the blood, and thus it exhausts the essential stream of life. All the other signs and symptoms so largely described appear to be necessary consequences of the reduced volume of the blood. The cause of this malady is unquestionably a peculiar poisonous matter, or ferment, the properties of which are unknown up to this hour; since neither chance nor science have discovered any curative antidote. The cholera is not so destructive as many other pestilences, and it is unquestionably not so freely communicated. The preventive methods hitherto adopted have not effectually stopped the spreading of cholera, either by land or by water, and even the most rigorous and arbitrary means have failed to prevent its communication through large cities. Nevertheless, we are bound to employ every caution to stay the spreading of the disease; because it is more than probable, that the intensity of the infectious poison is abated by every delay, and that it is diluted and rendered less virulent by being checked and controlled into a milder form as it spreads; for thus it happens in jail fever and malignant small-pox. I again earnestly wish to impress this on your minds as a consolatory doctrine, founded on sufficient evidence, and practically applicable, under the direction of common sense.

In delivering my advice to you respecting the treatment of cholera, I only ask your concurrence as far as your reason is convinced. I will not offer any invidious remarks upon the first rules laid down under the authority of Government; it is sufficient for my own justification to say, that I do not entertain the same opinions; and that I am entitled thus to dissent on the score of my known labours to promote medical philosophy, and from my long continued public and private practical experience. To assuage that terror which I think is unnecessarily and un-

wisely propagated, I boldly assert that pestilent cholera is not generally fatal in sound constitutions. or in persons who live temperately: let us therefore face the enemy, and cast aside those undue terrors which are too apt to sink men into fatal despair, and thence to augment their dangers.

On the first attack of pestilent vomiting and purging, let us regard those as natural and beneficial efforts to expel the poison; and let us watch the contest, until nature demands our artificial help. After the first few clearing discharges, aided by fifteen grains of magnesia in warm barley water to be given every hour for three successive times, we may safely interfere by giving from fifteen to twenty drops of tincture of opium, called also laudanum, in a glass of brandy, as the strength of the patient and the vehemence of the attack may warrant, and if immediately rejected by vomit, let the same dose be repeated every hour until it remains. This powerful remedy will often stop the disordered irritation of the stomach as if by a charm, the sufferer will fall into a perspiration if duly covered in heated blankets, and the pestilence vanish. This may be called the natural cure, as it arises from the discharge of the poisonous humour before it has had time to engender its kind in either the stomach or bowels.

For your better satisfaction, allow me to say, that I have been assured by several medical gentlemen from India, who have had the incipient attack of pestilent cholera, that this is a correct history, and that they have been restored to health within forty-eight hours. I think it also deeply deserving of notice, that as every similar poison is augmented under a lengthened continuance in the living body, the speedy stoppage of cholera is imperative; since it appears to gather in quantity or intensity with duration of the disease. When, however, the first stage has proceeded unchecked, and the exhausting discharges from the bowels continue, the best dependance is on an incessant supply of bland drink, such as rennet whey, or mustard whey with the white of an egg, given in small quantities, say a wine glass full, with the addition of eight or ten drops of laudanum, to allay the irritation of the stomach and bowels. If wine whey be given its free acid should be corrected by sal volatile or carbonate of soda, in doses of fifteen drops of the former, or fifteen grains of the latter, mixed with each cup of whey. Or thick barley water, arrow root, or gum arabic solution, may be given, with similar additions of laudanum, of sal volatile, or soda, or infusion of black pepper, cayenne, or ginger, in cases of sinking, where the preferable articles cannot be had. The body should be constantly heated by continued applications of hot blankets or flannels, and in public hospitals these cloths may be conveniently kept in readiness in a hot closet, such as is used by laundresses for drying linen; or on the hot water cylinders used for garden hot-houses, and for large rooms. All the best experienced authorities agree in stating, that the disease abates as soon as perspiration comes on. I request to be excused for not recommending the means proposed under the first Government authorities. External applications

to the limbs, such as mustard blisters, spirits of wine and camphor, would be utterly useless, since the stimulation of the skin depends wholly on the circulation of its blood, and where coldness and stagnation of blood befal the limbs, the only chance of restoring the circulation, is by invigorating the heart and filling its vessels through constant supplies of liquid stimulant nutriment—warm calve's foot jelly, beef tea, and rennet whey, require little digestion, and as they most resemble the serum of the blood, they may be advantageously taken as soon as the irritations of the stomach and bowels have been abated by laudanum, alkalies. aromatics, and soothing mucilaginous drinks,—quere, milk and water with albumen.

Finally, I regard every sort of cholera to resemble the others in effects, and dangerous consequences; and that the same views and the same treatment may be properly adopted, for them all. I am fully persuaded that chemical science will soon give us a curative antidote for the pestilent poison of Indian cholera; although the chance medley of empirical physic has hitherto failed; for it is to chemical science we must look, and not to the unavailing dissections of the dead, which in addition to the spread of natural horror, extend the infectious poison. Let us hope that the god-like art of healing will soon even overtake the beautiful science of astronomy, which has already, scaled the heavens and made us acquainted with the eternal and infinite structures of the universe, and that we shall as civilized society advances, become public officers to serve the whole community; instead of continuing a disgraceful worldly scramble in which every medical man becomes the enemy of his neighbour.

P. S.—My ingenious and scientific friend Mr. Goldsworthy Gurney, has just sent some important chemical suggestions, which deserve the attention of medical philosophers.

To Sir A. Carlisle.

My dear Sir,

The uniform and uninterupted progress of the disease, which by common consent, is called cholera, shews that hitherto all attempts to stop its ravages have failed; and, judging from public and other sources of information, I fear little has been done for it by medical treatment. It is observed by all classes of society, and with considerable concern, that medical men are divided in their opinions on some of the most important points connected with the disease—some are quarrelling about terms, which mean nothing, while others are discussing effects, without considering causes. All at present seems speculative and unsettled. In this state of things I send you the following observations, which I otherwise should not have done, considering it a public duty to society at this moment, that every person who supposes he can point out anything likely to be useful in this disease, should communicate his views to some one capable of judging of their value; and, if he confines himself to a private friend, and does not trouble the public, no matter how speculative they may

appear, even to himself. Under this feeling, and knowing the peculiar direction of your scientific researches, I beg to submit the following views respecting cholera, which have been floating in my mind ever since I left London. The particular object which I have pursued for the last few years, has been for the present, suspended by indirect acts of parliament, I have therefore had time to make a few experiments in connexion with the subject, which strengthen the opinions I am about to submit to you.

It appears, under all circumstances, that the best, and perhaps the only, line of study calculated to produce much solid or satisfactory information, will be by an inquiry chemically, so far as we are able, into the *elementary nature of the poison* which produces the disease. Considering the subject under this impression, we will take a general theoretical view of the physical nature of this poison. Our first conclusion will be, for it is self-evident, that every poison capable of producing disease, no matter how introduced into the system, whether through the lungs by the absorbents, through the skin, or by the stomach, is *material*; it has the ordinary physical properties of matter, and must obey its common laws. These laws render it capable of being communicated from person to person, or thing to thing, either through the atmosphere, or by any solid substances. In one state the poison may be so light as to float easily with the wind; in another state it may be so heavy as only to be moved by solid substances from place to place; in other states it may be so nearly on a balance with the atmosphere, so that, like very light dust, it may float with it, or settle on divers substances, and move with them, as by chance alone it never can be disturbed or otherwise influenced by mechanical causes; and thus a specific disease may, in the language of medicine, be epidemic, contagious, or infectious at the same time—these being terms which only express the manner in which a disease is communicated. These circumstances, do not, however, alter the nature of the poison.

Secondly. *Every specific poison must be a compound*: because no simple element (I am now speaking in chemical language) can be capable of producing a specific disease. This compound must be a chemical one, and definite; because the same kind of poison produces the same disease, and because all chemical bodies are definite. The poison of cholera produces a specific disease, it is therefore a definite chemical compound.

Our next inquiry will be into the nature of the *base or elementary constitution* of this poison, and a union of chemical and physiological research is necessary for this purpose. The last I fear will only indirectly assist us in our inquiry, since they are both but little understood as connected with vitality. You know the decompositions and combinations effected by vitality are not reconcileable with common chemical laws of matter: or is it not more easy for the chemist to explain how certain changes are produced by the living principle, than it is for an engineer to explain how or from what cause the origin of muscular power is to be attributed. We often find animal chemistry converting one simple element into another

simple element, which in the language of the schools is a physical impossibility; yet it is so; it has been shown by you; and the accurate observers of nature see it every day. These imperfect sciences however are the only means likely to benefit us in our research, and if we do not confine ourselves too long to negative terms and effects, and mistake them for positive facts and causes, we may by general analogy and reasoning possibly be led first towards a just suspicion, which may ultimately terminate in correct conclusions and practical truths. If by these means we can establish any valuable practical point, it matters not how much, or how long, its true theory may rest on circumstantial evidence. With this feeling let us take a general view of the character of the diseases said to be epidemic or infectious, which are occasioned by atmospheric or foreign agency. We shall find that some are inflammations and of an exciting nature, and that some are typhoid, and have a sedative tendency.

Amongst the first, may be classed all those said to be epidemic, such as agues, and influenza; amongst the second may be classed all those said to be infectious, or contagious, such as putrid typhus, plague, small-pox, and from all I can learn malignant cholera. These diseases are distinct in themselves, and are occasioned, I presume, by poisons of a different base; that of the first class I have every reason to believe is produced from vegetable decomposition, and is epidemic; the latter from animal decomposition. and is contagious. The peculiar element which gives the specific character to either will most probably be found in the kingdom from which they respectively originate, and therefore we must look [to animal matter for the element which affords the base of these poisons, and which produce a putrid or decomposing tendency in the living body. In the analysis of vegetable matter, we find the elements hydrogen, carbon, and oxygen; in the analysis of animal matter we find these three, and also nitrogen, in abundance. It would appear therefore at first view of the subject, that we should look to nitrogen as the base of this characteristic animal poison, but when it is recollected that the atmosphere contains a large proportion of this substance losely combined, if not mechanically mixed, we must see that it is present in all cases of vegetable changes, and so far, it is as likely to combine in any new formation in the one case as in the other; it is therefore not likely to be the principle which gives the characteristic property to this poison; we must therefore look further, for some other body in animal matter which is not present in cases of vegetable decomposition, for the base of putrid poison. On ultimate analysis, we shall find phosphorous forming a component part in all animal matter; in some state of combination, this element looks more suspicious than nitrogen, for although nitrogen is poisonous and offensive to the animal functions, when in some state of combinations, phosphorous in its simple state is highly so, and when taken into the stomach produces effects and symptoms very like choleric poison; this element is not met with in vegetable matter, and although the appearance of it, as sometimes seen in rotten wood, is produced by animalculi. In certain states of combination phosphorous is still

more highly poisonous, and when partially given out, by the first process of decomposition, in fish, occasions their poisonous quality and symptoms, (not unlike cholera) also in other animal substances the same effects are observed. I have previously stated, that living animal chemistry changes one simple body into another; I would here instance the fact, with which you are well acquainted, of the vital principle converting sulphur into phosphorous, during the incubation of bird's eggs; in short, so great is the tendency, either to its formation or liberation in all cases of animal putrefaction, that in the first processes it may generally be detected, and occasions the peculiar odour which invariably arises in that stage. It is one of the first products of putrefaction, and therefore likely to induce the same putrefactive tendency when brought in contact with certain animal matter even in the living state, like as yeast produces a fermentative disposition when brought in contact with the same kind of matter which has generated it. Thus in some cases of dead animal matter, poison of a simple putrefactive tendency would be produced, but in the living body, under process of specific disease, poison of a specific character and properties would be produced.

That the putrid-tending fever, produced by the inoculation of matter, "by animal yeast," from a subject in such state in the dissecting rooms, is not improbable, the analysis of some animal poisons, such as that of the viper and rattle-snake, are well worth recollecting in connextion with this view of the subject. It is not therefore improbable that this element in a peculiar state of combination is the base of the worst, and most mild crses of infectious disease, in some instances spreading the plague, in some typhus fever, some small-pox, and some the disease which we call spasmodic cholera.

If you think this view of the subject worth further notice, experiments may be made on the nascent combinations of phosphorous, which are at present but little known, with a view of judging more accurately of their effects on the animal economy, and also with a view of decomposing them by simple or complex affinities. Under the above hypothesis many substances would suggest themselves as likely to destroy or decompose contagious poison, such as hydrogen, sulphuretted hydrogen, increased temperature, which easily decomposes all loose phosphoric combinations. I would call your recollection here to the notorious fact of small-pox matter being rendered very soon inactive if carried in the waistcoat pocket, or in any warm situation. This fact seems to support the above hypothetical suggestions.

How far chlorine and its compounds affect specific typhoid or contagious matter is questionable; but there is no doubt that they suspend general animal putrefaction, and so far are of considerable value in destroying some of the predisposing causes which render the system liable to the more malignant specific poisons. It may possibly be useful to admit chlorine gas into any apartment which has been whitewashed against the disease, while the lime-wash is yet wet.

If the foregoing observations, or any part of them, in your esti-

mation are worth farther notice, perhaps you will turn them over in your mind.

I am, dear Sir Anthony,
Faithfully your's,
Bude, Cornwall. GOLDSWORTHY GURNEY.

AMERICAN PATENT.

Specification of a Patent for a Machine called the Self-regulating Conduit; for passing water around canal locks, from a higher to a lower level. Granted to James Clarke, *Westmoreland county, Pennsylvania, January 25,* 1831.

The bottom of the conduit, connecting with the upper level of the canal, must correspond with the bottom of that level, and be carried to such a point between the upper and lower levels of the canal as shall be found most convenient for the construction of the regulating gate; the lower level of the conduit must be on a plane with the lower level of the canal, or may be sunk as much lower as the particular circumstances of the case may require. The dimensions of the conduit must be regulated in proportion to the quantity of water which it is intended to vent. At the connexion of the two levels of the conduit, the regulating gate must be placed, and constructed in the following manner.

Two, or more, mud sills are framed together, and are placed horizontally at the bottom of the lower level of the conduit, into which two upright gate posts are placed, one on each side of the conduit, and extending from the bottom of the lower to the top of the upper level; these posts to be supported by a cap sill, braces, and longitudinal frame work, covered with plank extending each side of the gate, so as to conduct the water towards the gate, and to serve as an apron to convey the water over the air box, buoy, or float. A groove or rebate must be cut in each of the gate posts, so as to receive the gate, and extending from the top of the posts downwards, a sufficient distance, to admit the top of the gate to be drawn down to the bottom of the upper level of the conduit. When the size of the gate shall be such as to prevent it sliding easily in the grooves, or rebates, metals, boxes, or friction rollers, will be placed so as to admit a free action of the gate.

The gate must be constructed of plank well jointed and secured together, and be of a height corresponding with the greatest depth of water intended to be maintained on the upper level. This gate is connected with an air box, buoy, or float, placed in the lower level, which box, buoy, or float, must be of a size and buoyancy, sufficient to raise the gate as the water shall rise in the lower level. This box, buoy, or float, is connected with the gate in the following manner. Two, or more, screws, are required with flat heads, resting on the top of the box, buoy, or float, and secured to it by metal plates,

having holes in them sufficiently large to admit the shank of the screw to pass upwards through them. When these plates are fastened to the box, buoy, or float, the heads of the screws will turn under them in the manner of a swivel. Holes corresponding with the screws must be bored in the lower edge of the gate, and be of sufficient depth to admit the box, buoy, or float, and the gate to be screwed together, or apart, so as to maintain any required quantity of water on either level. Screw nuts must be placed in these holes so as to govern the gate. The screws are provided with holes in their shanks, near the box, buoy, or float, to admit the end of a turning bar or lever, for the greater convenience of working them. When it is intended to maintain a greater quantity of water on the upper than lower level, the gate must be screwed from the box, buoy, or float; when the greater quantity is required on the lower level, the gate must be screwed towards the box, &c.—The operation of the machine will be as follows. The water, in passing the conduit, will flow over the top of the gate into the lower level; as the water rises in the lower level, the buoyancy of the box, buoy, or float, will force the gate upwards until the required quantity is obtained in the lower level, when the upper section of the conduit will be closed by the gate. Should the water sink in the lower level, the weight of the box, buoy, or float, will draw the gate downwards, so as to admit the water to pass over its upper edge, thus producing a regular supply, and such depth of water in the canal, at all times, as may be desirable. JAMES CLERK.

LIST OF NEW PATENTS SEALED.

EXCAVATION.—To G. V. Palmer, of Worcester, for improvements in machinery for excavating. Specification to be enrolled in six months. Jan. 24, 1832.

POLISHING.—To J. J. and J. Maybury, of Staffordshire, for improvements in polishing ladles, spoons, &c.—Jan. 24, 1832.—Two months.

PENS.—To J. Perry, of Red Lion Square, for improvements in or on pens. Jan. 28, 1832.—Six months.

SPINNING.—To J. Jellicorse, of Yorkshire, for improvements in spinning machinery.—Jan. 28, 1832.—Two months.

STEAM.—To W. L. Wharton, of Durham, for improvements in engines for raising water.—Jan. 30, 1832.—Two months.

FLUIDS.—To C. Smith, of Bishopsgate, London, for an apparatus for regulating the action of fluids and liquors.—Jan. 31, 1832.—Six months.

WATER.—To T. J. Fuller, of Limehouse, for an improved process of raising water or other fluids.—Jan. 31, 1832.—Six months.

MACHINERY.—To W. Church, of Birmingham, for improvements in apparatus to be employed in the transportation of goods or passengers, &c.—Feb. 9, 1832.—Six months.

POWER.—To J. Ericsson, of Liverpool, for an improved power engine. Feb. 9, 1832.—Six months.

LACE.—To J. Heathcoat, of Tiverton, for a method of embroidering devices upon lace and other fabrics.—Feb. 16, 1832.—Six months.

CUTLERY.—To J. S. Nettlefold, of Red Lion Street, Holborn, for improvements in table furniture.—Feb. 16, 1832.—Six months.

SPECTACLES.—To G. and E. Solomons, of Stepney, for improvements in preparing substances for spectacles.—Feb. 16, 1832.—Six months.

WOOLLEN CLOTHS.—To R. Atkinson, of Huddersfield, for an improved method of raising or brushing woollen cloths.—Feb. 16, 1832.—Six months.

PATENTS ENROLLED BETWEEN 10TH FEBRUARY, AND 10TH MARCH, 1832.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

Fire Arms.—To J. De Burgh, Marquis of Clanricarde, a patent "for improvements in fire arms, and in the projectiles to be used therewith," was granted on the 15th of July, 1831, and the specification was enrolled in the Petty Bag Office on the 14th of January, 1832.

The improvements above mentioned consist in a moveable receptacle termed a "sliding-breech," into which the charge or projectile is immediately put, instead of loading in the usual way at the muzzle of the fire arm; and in the employment of a solid cylinder of lead divided into several pieces, instead of spherical bullets.

In the specification is given an example of the application of these improvements to a large kind of pistol. The handle, cock, and other mechanical movements employed to ignite the charge, are much the same as in other fire arms; the barrel is provided at its breech end with trunnions, which enter apertures made into two strong iron plates fixed on the sides of the stock of the pistol; and a cavity is left between the two plates next to the end of the barrel for the reception of the sliding breech, which is internally made cylindrical for receiving the charge, and externally adapted to fit into its recess; it has a touch-hole and tube for the application of a percussion cap, and turns upon an axis at one end into an inclined position, and by a motion of the hand, similar to that of half cocking a common gun; the charge being now inserted, and the breech shut down, its orifice is brought to bear in an exact line with the interior end of the barrel. In order that these parts may be accurately and firmly connected, the exterior edge of the orifice of the breech, and the interior edge of the orifice of the barrel are turned to cones of similar inclinations so as to fit concentrically; and they are brought into close contact by a transverse wedge situated at the back of the breech, which by the action of a simple lever of great mechanical energy, moved by the thumb and fore-finger of the right hand (somewhat similar to that used in shutting down the pan of a common fire-lock), forces the breech into the end of the barrel, and thus prepares the arm for being discharged. The sliding motion of the breech is only through the space of from a quarter to three-eighths of an inch, and it is guided laterally, by the side plates—above, by an overlapping plate—and below it is confined by a fixed screw which works through an aperture adapted

to it. The wedge, therefore, causes the breech to slide and lock all fast; and to reload, the lever of the wedge is thrown back by the right hand, and the fore-finger of the left hand then laying hold of a kind of trigger, draws the breech out of the barrel, when the former is again turned up, and recharged with the projectile; which projectile is of the following description.

A solid cylinder of lead, about 2½ times the length of its diameter, is divided longitudinally by two cuts at right angles to each other, through its axis; and again by two other cuts transversely at equal distances from each other and from the extremities of the cylinder; thus producing twelve equal and similarly formed pieces, except that at one end of the cylinder a hole is made in the centre to receive some percussion powder. As the cutting of these pieces out of a solid cylinder of lead is attended with some difficulty, the patentee has constructed a mould for casting them of these forms. This mould is a tool consisting of three limbs or bars sliding over each other by being connected at one end to a common joint or centre. The cavities or moulds in each of these bars are short cylinders, divided longitudinally as before mentioned by thin metallic partitions; so that by a tool of this kind the twelve separate pieces of the projectile are easily cast and cut off. This combination of pieces is then wrapped in paper with the requisite quantity of powder at one end to form the cartridge, which is made of suitable dimensions to fit the chamber of the sliding breech described. We should now state that the barrel of the pistol (or other arm) is made gradually to widen, laterally, from the breech to the muzzle, where it assumes the form of an extremely long ellipsis (its transverse axis being about three times that of the conjugate), which will cause the pieces of lead to separate and spread laterally, so as to wound or destroy a great number of persons.

We must not, however, suppose that the noble marquis has taken out a patent for killing people; and it is evident from his specification that he supposes the cholera morbus is doing that fast enough; for he uniformly calls this truly inoffensive instrument, "a formidable weapon of *defence*." Our intelligent readers will therefore have the goodness to bear in mind that what is "good for the goose is" not "good for the gander" in this case, and that the patent only extends to the "exercising and using the aforesaid invention"—"defensively."

Steam Engine and Propelling.—To Moses Poole, of the Patent Office, of Lincoln's Inn, Gentleman, a patent for "improvements in steam engines, and in propelling boats and other floating

bodies," the communication of a foreigner, was granted on the 13th of July, 1831, and the specification was lodged in the Enrolment Office on the 13th of January, 1832.

There are three claims to invention made in this specification—the first for an improved means of augmenting the draft of chimnies of furnaces for steam boilers, the second for an improved metallic piston, and the third for a method of propelling by means of vibrating paddles.

It is proposed to augment the draft of the chimney by forcing, through the medium of a cylindrical or other blowing machine, a quantity of condensed air into the flue, at some distance from the fire, and in the direction from the fire towards the top of the flue, that the current of condensed air may carry with it the heated air, smoke, &c. as they proceed from the fire, and cause an additional supply of oxygen by the additional quantity of atmospheric air drawn through the chimney.

The improved piston consists of two metallic rings, with a top and bottom plate to keep them in their places. The exterior ring is made cylindrical exteriorly and conical interiorly, with several projecting ribs or pieces for the interior ring, which is made conical exteriorly, and cylindrical interiorly, to rest upon, and press against. The exterior ring is cut through on one side, that it may expand and fit accurately the interior of the cylinder when pressed out by the interior ring.

The inner ring is forced down upon the outer by a series of spiral springs, which act in holes bored partly downwards through the inner ring, and partly upwards through the upper plate. This plate is provided with a tongue of metal which fits into the opening cut in the exterior ring to prevent the escape of steam by that means.

The proposed improved method of propelling consists of a set of vibrating paddles, similar to those of Nairn's, described in the 2nd volume, on the 298th page of the new series of the *Register of Arts*, with this difference, that Mr. Poole makes the leaves of his paddles extend only on one side of their stems. By this means he is enabled to bring his paddle stems nearer to the vessel's sides, though he will have in consequence a twisting, instead of a direct action upon the paddles.

Fire Arms.—To A. Dermondion, of Old Fish Street Hill, London, a patent "for an improvement on guns, muskets, &c. and in carriages to be used therewith, and in the method of priming the same," was granted on the 13th of July, 1831, and the specification was enrolled in the Enrolment Office on the 13th of January, 1832.

To have a ready means of introducing the charge at the breech, to facilitate the process of priming and firing, and to amend the method of attaching bayonets to muskets, seem to be the improvements contemplated by this patentee, or rather by the foreigner who is said to have communicated the invention to him. The first of these objects he proposes to obtain by means of a moveable breech firmly attached to two strong side plates. These plates fit upon two gudgeons, projecting one on each side of the gun barrel, about an inch and a half from its breech end. The end of the barrel is formed into a convex circular curve, whose axis is coincident with the centre of the two gudgeons, and the breech itself, which is made of iron, with a piece of gun metal fixed upon it next to the barrel. From the breech a lever or raising handle proceeds to nearly the but end of the stock, where it is detained by a spring catch when the gun is loaded and ready to be fired. The lock consists of a single spring attached to the stock at one end, and having a hammer at the other for striking and firing the percussion powder. This hammer strikes upwards, and it is released by a trigger projecting below the stock in the usual manner. The spring of the lock is brought into tension by means of a short projecting piece, with an anti-friction roller at its end, which descends and presses down the spring as the breech is raised from its place, and when it is once pressed fully down, the trigger catch retains it in its place until it is released in the act of firing.

Mr. Demondion's method of priming consists in the use of a very narrow copper tube, containing percussion powder, which he inserts partially into the cartridge, leaving one end projecting behind at the lower edge; as the cartridge is put into the barrel, a cap, or priming pan, of an angular form, connected with the breech, descends upon this projecting percussion tube, and forms a resistance to the blow of the hammer in the act of firing. These tubes are to be inserted into the cartridges either in straight pieces, or their ends are bent quite back and then turned up at right angles, so that the turned up portion may be glued into the cartridge to hold the tube steady. The tubes are formed of very thin sheet copper drawn through metallic moulds of appropriate forms, first to shape it into a kind of trough, and then into a cylinder, and while this process is going on the percussion powder is introduced. The tube is then to be cut into the required length by scissors, which at the same time close the ends of the pieces by squeezing the opposite sides together.

The method of fixing on bayonets may be shortly described to consist in a sliding hasp, which embraces the barrel and also the end of the bayonet, which is made to fit upon only the lower side,

instead of surrounding the barrel according to the usual plan of fixing bayonets; a projection from the lower part of the barrel fits into a hole in the bayonet, and prevents it from being drawn forwards or pushed backwards, while the hoop keeps it close to the barrel. A spring catch prevents the hoop from slipping till the bayonet is required to be removed.

Roasting Meat.—To R. Hicks, of Wimpole Street, Middlesex, Surgeon, a patent "for improvements in culinary apparatus," was granted on the 6th of July, 1831, and the specification was deposited in the Enrolment Office on the 4th of January, 1832.

These improvements consist in the application of ignited gas to the roasting of meat, by directing the flames arising from a series of annular burners into the interior of a corresponding number of conical hoods, containing the meats to be roasted. In a recess on one side of the breast work of an ordinary kitchen chimney is fixed dresser, underneath which is a gas supply pipe from the street main is passed in an horizontal line, having a series of short pipes proceeding vertically from it; each of these pipes is provided with a stop cock under the dresser, and terminates a few inches above it in an annular burner; the burners are connected to the vertical pipes by radial arms curved upwards, and hold each a small dish or basin to receive the dripping and gravy, which is conducted by a spout into a common basin contiguously placed in the dresser. To each of the upright tubes is also fixed a vertical spit, in which the meat is put; and above each of these is suspended by a chain, pulley, and balance weight, a hollow metallic cone, open at its apex; these are brought down so as to inclose the meats on the spits within them, leaving a small space around, or between the latter and the conical hoods, for the passage of the heated air and vapours, produced by the action of the ignited gas in the annular burners beneath them. For the purpose of basting the meat during the roasting process, a small colander is fixed centrically near the top of each of the conical hoods, and a small pipe leading from a lip on the outside, conducts the gravy (supplied by a ladle from the basin on the dresser before mentioned) into the colander, and thence over the surface of the meat.

In the drawing accompanying the specification a series of five burners and hoods (each constituting a distinct apparatus) are shewn attached to a dresser having a flattened dome above, which receives the heated vapours and gases that pass through the apertures in the upper extremities of the conical hoods, and conducts them through a lateral opening in the brick work into the kitchen chimney.

Our diagram, fig. 1, Pl. V. shows only one of these apparatuses, partly in perspective, and partly in section, to save the necessity of more illustration:—*a* represents the supply pipe from the street main; *b* one of the vertical tubes having a cock at *c*, and passing through the dresser *d*, where it terminates in the curved arms which hold the small dripping pan *e*, and is surmounted by the annular burner *f*. *g* is the spit carrying the leg of mutton *h*; *i* the conical hood suspended by a chain *k*, over the pulley *l*, to a counterbalance weight *m*; *n* is the basting colander, *o* its lip, and *p* the reservoir basin: *q* the lateral aperture leading into the common chimney.

As "the proof of the pudding lies in the eating," and we have never been indulged with a taste of the the patent roasted mutton, we cannot say that it smells of carburetted hydrogen, or that it tastes of the smoke thereof, but our suspicions are a little excited on that point, and will not be allayed until we have had the pudding demonstration. We are also inclined to think that the patent mutton will not have that agreeable flavour which is produced by the radiated heat of a common fire.

The claim to invention under this patent is not properly defined; it is merely stated to consist in the above or before-described apparatus, without taking any notice of previous similar inventions for the same purpose, by Cochrane and others: without such information (which the law justly requires), how are the public to know in what the "improvements" consist? and how are manufacturers to learn the extent of the monopoly granted?

Boiling and Evaporating.—To Jacob Perkins, of Fleet Street, London, Engineer, "for improvements on his former Patent, dated July 2, 1831, making the same applicable to the evaporating and boiling of fluids for certain purposes," was granted on the 27th of August, 1831, and the specification was deposited in the Enrolment Office on the 27th of February, 1832.

There is a fashion in patents and mechanical inventions as well as in other matters. It is now the rage to construct boilers so that each individual particle of water composing the entire mass, shall perform certain evolutions, termed "circulation," with the view of obtaining a uniform temperature throughout the boiler; the inventors apparently forgetting, that *nature* performs this operation pretty well without their assistance. We have recently described many patented contrivances for this purpose by different individuals, and we have now the same individual (a man of undoubted talent and great ingenuity), taking out a second patent for the same needless object.

In our number for February last (part 55), p. 10, we gave Mr. Jacob Perkins's first circulation patent, in which he proposes to place partial linings within a few inches of the interior surfaces of the boilers. In the patent we have now to describe, which is stated in the title to be "for improvements upon his former patent," the aforesaid linings are to be augmented, so as to cover a more extended surface, and form nearly a complete internal vessel at a few inches distance from the external one: and as we doubt not these circulation boilers will be an object of great interest for some time hence, we shall present our readers with lineal representations of their several varieties, as they successively pass from under the "great seal" on to the Chancery Rolls.

At fig. 2, Pl. V. is given a vertical section of a brewer's furnace and copper used in boiling worts for making beer:—*a* is the furnace, and *b b* the lateral flues therefrom; *c* the copper, *d* the internal vessel (termed by the patentee "an apparatus or machine", having a large opening at bottom, and supported at uniform distances from the sides of the boiler by the legs or struts shown. By this arrangement the patentee states that the water or other liquid will constantly run from the bottom up the sides, and taking the course indicated by the arrows, will return downwards and pass upwards again by its former road, and that thus a constant circulation of the fluid will be kept up; preventing hops, or other gross matter contained in the wort, from adhering to the bottom and sides of the boiler, and completely superseding the necessity of that cumbrous appendage used by brewers termed by them "*rousers*," and the great labour attending their use. If the artificial circulation induced by this internal vessel will really perform the office of the "rouser," it is a valuable invention; but we can discover no reason why the central portion of the fluid as it becomes heated should not rise vertically through the large opening in the bottom of the internal vessel, and produce a counter current to that described, causing the hops and saccharine matter to be attacked in front and rear with equal energy, and become wedged fast between the two vessels, from which dilemma we think even the rousing of the *rouser* would prove ineffectual.

The patentee proposes to apply his invention to the boiling of cane juice and syrups, and has illustrated this application by a drawing, which our diagram, fig. 3, Pl. V. sufficiently explains. We have not distinguished the parts by any letters of reference, as they differ only a little from the former in their proportions; and the same objection applies to this modification of the "machine," though perhaps in a greater degree, on account of the difficulty there would be found in ladling, or otherwise discharging and clear-

ing out completely the saccharine solution, with the necessary celerity, when it has arrived at the proper point of concentration.

A third application is described in the specification—that of evaporating brine, in the preparation of culinary salt. The form of vessel used for this purpose is delineated in section at fig. 4, Pl. V. where *a* represents the furnace, *b b* the boiler or pan, having an arched tunnel in the middle running the whole length of the vessel, inclosing the furnace and flue: *c c* is the interior lining or curved plate, which it is said directs the currents of the fluids into the courses, indicated by the arrows, and the superior heat of the arched portion of the vessel causes the crystals of salt as they are formed to be thrown off into the deeper and less heated receptacles on either side.

This modification of the "machine" is perhaps the least objectional, as it will cause less obstruction and inconvenience than those previously described; but we anticipate that the "salt maker" will not long tolerate the current-guiding plates *c c*, which are of no more use in expediting the evaporation of the fluid, than if the said plates were placed on the deck of a steam boat to guide and accelerate its motions.

COFFEE MILLS.—To D. Selden, of Liverpool, Merchant, a patent "for improvements in metallic mills for grinding coffee, corn, drugs, paints, and various other materials (communicated to him by a foreigner)," was granted on the 11th of August, 1831, and the specification was enrolled in the Rolls Chapel Office, on the 11th of February, 1832.

The improvements mentioned above are not of a very important character; the mechanical construction of the mills does not differ essentially from several others that have preceded them, as will be seen on reference to our diagram, fig. 1, Pl. VI. which exhibits the interior of one half of a small domestic post or flange mill for grinding coffee, or similar substances. A plate of iron of the varied form shown at *a b c* is cast, the part *a* forming a portion of a flattish hopper, *b* the entire flange by which it is fastened to a post, or other projection; *d* is a boss of cast iron turning on a central axis at *e*. This boss may be considered of the figure of a segment of a sphere, or of an extremely obtuse cone, with grooved teeth cut in tangential lines from inner circles, which are deepest at the centre and brought "to nothing" at the periphery, where it is provided with little projecting pieces termed *cleavers*, in order that the ground coffee may not be impeded in its escape by clogging up. Over the boss *d* is fixed a concave counterpart, in which the grooves are cut in a con-

trary direction, so as to produce the usual clipping angle, precisely the same as in the opposite stones of the common flour mills. This portion of the mill has also cast to it, a hopper piece similar to that shown at *a* in our diagram, and a series of ears and holes corresponding with those marked *e e*, through which both pieces are connected together by rivets.

The material to be ground being put into the hopper, is conducted to the centre of the mill where the teeth are coarsest, and approaching the periphery as it becomes reduced, from whence it is at length thrown out by the clearers into a race, and it falls down into a cast spout at *f*, which delivers into a recipient in the required divided state.

The specification mentions the application of this mill to the preparation of flour; but we do not think it is at all calculated for such a purpose, on account of the difficulty that would attend the exact formation and fitting of the grinding surfaces, especially the concave portion; and which, if practicable, would so enhance the expense, above all others, as to prevent its adoption. With good management, it may find a market as a domestic mill for grinding coffee, and such substances as are not required in a finely divided state. The inventor has judiciously endeavoured to reduce the cost of manufacture, by making it almost wholly of three cast pieces rivetted together, and the plan is evidently susceptible of some improved modifications; but it would be needless in us to suggest them, on account of the injudicious claim made by the patentee, of the exclusive right to make similarly arranged teeth in iron, though acknowledged in the specification to be made in imitation of those ordinarily used in stone.

BLASTING ROCKS AND MINES.—To W. Bickford, of Tucking Mill, in the county of Cornwall, Leather Seller, "for an instrument for igniting gunpowder when used for blasting rocks, which he denominates the 'Miner's Safety *Fuse*'," a patent was granted on the 6th of September, 1831, and the specification was lodged in the Enrolment Office on the 28th of February, 1832.

This instrument, denominated by the inventor the "*Miner's Safety Fuse*," is a minute cylinder of gunpowder, or other suitable explosive mixture, inclosed within a hempen cord, which is first twisted, then countered or overlaid to strengthen it, afterwards varnished to preserve the combustible matter from the effects of moisture, and finally coated with whitening, or other light pulverulent matter, to prevent the varnish from sticking to the fingers, &c.

The patentee verbally describes, with great attention to exact-

ness, the most minute and unimportant parts of his very simple apparatus, which are moreover fully explained by elaborate and correct, though coarsely-executed, drawings; and so liberal has Mr. Bickford been to the public, in return for the exclusive privilege of the patent, that he indulges them not only with the representation of his mechanism, but every door, window, wall, board, joist, rafter, roof, and almost every nail of his extensive manufactory is placed before them in every point of view for examination; thus fulfilling the law not merely in the spirit, but beyond the letter thereof.

At one end of the twisting room, 65 feet in length, is a closet, where for greater security the operation of filling with the explosive mixture is conducted, which we will describe with reference to Pl. V. fig. 5, where *a a* represent a frame of wood, which is attached to a shelf in the filling closet about five feet above the floor, and supporting a funnel *b* containing the powder; 12 threads *c c*, of loosely spun yarn, proceeding from 12 balls *d d* of that material deposited in the lower part of the closet, are carried upwards and passed over a hoop of cane *e e*, from whence they converge towards and pass through a conical boss *f f*, which has a series of equi-distant apertures around it for that purpose. These apertures are so inclined to the axis of the cone, that at their points of emergence the 12 threads come nearly in contact, and being immediately beneath passed together through a hole, the twisting of them is easily effected; during this operation the powder is permitted to flow from the reservoir *b* in a regulated thin stream in the centre of the threads, which continually present by their convolution a central funnel-formed cavity adapted to receive it; and by the continued action of twisting, the powder is pretty evenly laid in the centre of the cord.

The apparatus for twisting, we believe, varies but in a trifling degree from that in general use. This consists of a bench about 60 feet in length, and less than a foot in breadth; having on one side a raised tooth rack, and on the other a plain ledge for guiding a "monkey" in travelling along it. A portion of this apparatus we have sketched at fig. 6, Pl. V. *a* represents the toothed rack, *b* the external ledge, *c* the monkey formed of a flat board mounted upon little wheels, underneath; *d* a toothed wheel taking into the rack, and giving motion to an inclined double wheel *e f*, through the medium of the lesser circle *e*; the larger one, *f*, actuating a little conical pinion *g*; on the axis of this pinion is fixed the "crook" (or hook) *h*, that holds the cord *i i*, which is thus twisted round with great velocity, the motion being produced by the monkey being drawn along the bench. The fusee cord, first shown in fig. 5,

as descending vertically and then changed into the horizontal direction by the pulley *k* being drawn out and twisted in lengths of about 60 feet, are cut off, and the ends being carefully secured by tying, are ready for the second operation of countering.

In this operation each length of cord is stretched out its whole extent, one end is secured to a swivel crook, and the other is fastened to a crook fixed on a small mandril, which is put in rapid motion by a cord passing round the rim of a large wheel turned by hand. The threads used for countering are six in number; they are laid on at right angles to the former twist, by what is technically termed a *jack*; this instrument has a hinge joint, dividing it into two equal and similarly formed portions, as shewn at *n*, fig. 7, Pl. 5; it has also two semicircular grooves, *o o*, across its breadth, which accurately meet together when the instrument is shut up, and thus form a circular hole of the size of the intended fusee cord after it has been countered. Each of the semicircular grooves are also closely indented with small diagonal lines to correspond with the threads of the countering; and there are six small holes in the *jack* at *p*, through which the threads are passed from balls or reels carried in the apron of the *counterer*, who after attaching the threads to one extremity of the cord, doubles up the jack over it, and holding the instrument steadily in the right inclination, advances gradually to the great wheel, which through the medium of the mandril before mentioned, rapidly turns round the cord, and draws the countering threads through the jack evenly upon its surface.

The next process of varnishing and coating the countered fusee cord, is to place them upon separate reels ranged over a furnace and caldron containing the melted varnish, which is to be a composition of tar and rosin, in proportions varying with the climate, temperature, and other circumstances. The caldron used by the patentee, is an open oblong vessel, having a partition in the middle of less altitude by two or three inches than the sides; the fire-place underneath extends to only one half the length of the melting vessel above, so that should the fluid boil over, it would be thrown into that compartment of the vessel which is remotest from the fire, kept empty for the purpose. A morticed bar or case of wood is fixed vertically above the fluid varnish, having a smaller bar which slides longitudinally out of it as from a socket, fixable by a screw at any desired extension; and to the lowest extremity of the small bar is a semi-cylindrical block, having on its curved under-side a number of grooves corresponding in size and number to the fuse cords operated upon at once; this semi-cylindrical block is plunged under the surface of the varnish, and the cords descending from the several reels passing

under it, are plunged thereby into the varnish, and thus circumstanced the whole lengths on the reels are drawn through it, passing first over an inclined draining plate on to a long wooden bench, which is strewed or powdered with chalk, or other suitable matter, that readily attaches itself to the varnish, and prevents the fusees from sticking together.

It cannot be doubted that fusees so accurately prepared, of every required length, will be found of essential utility in facilitating mining operations.

Carriage Wheels, &c.—To George Forrester, of Vauxhall Foundry, Liverpool, in the county of Lancaster, civil engineer, a patent "for certain improvements in wheels for carriages and machinery, which improvements are applicable to other purposes," was granted on the 5th of September, 1831, and the specification was deposited in the Enrolment Office on the 5th of March, 1832.

This invention consists in a peculiar mode of combining cast iron, with malleable iron, in the construction of wheels of all decriptions, except those of very small dimensions, such as clocks and watches; and in the application of the same principle or process of construction, in making the framing of steam engines and machinery, the arches of bridges, and in every case where cast iron framing may be employed, or wherein great strength and lightness are desiderata.

The mode adopted by the patentee seems admirably calculated to accomplish the important object he has in view. The specification informs us that he first makes a skeleton or light frame of wrought iron or steel, of the shape of the articles required, but of considerably less dimensions as respects the thickness. This skeleton is brightened, freed from oxide, and perfectly cleaned by grinding, scouring, and filing, or any convenient operation, so as to adapt it to receive a coating of lead, bismuth, tin, zinc, or any mixture of those metals; such coating to be performed by similar means to those used in the well-known process, called "tinning." The article to be cast having been moulded in sand or loam in the common way, the skeleton, coated as before mentioned, is carefully laid in the middle of the respective parts of the mould, projecting pieces being attached to the skeleton to keep it in its proper place. The mould is now to be closed, and the cavities formed by the pattern are to be filled up with fluid cast iron, which completes the operation.

In our Plate VI. we have given by figures 2, 3, 4, 5, illustrations of the construction of one of the leading objects of the invention, that of wheels for railway carriages; which will also

serve satisfactorily to explain the mode of applying the principle of construction to the other purposes mentioned in the specification.

Fig. 2 exhibits a side view of the wrought-iron skeleton framing. Fig. 3 shows an edge or outside view of the peripheral ring of the skeleton, showing its proportional breadth, and that it contains a number of holes made throughout the circumference, for the purpose of allowing the fluid iron in casting to flow through the holes, and fix itself in a solid mass around the skeleton. Fig. 4 represents a section of the wheel in the line of its motion; the part left white, shewing the skeleton embodied in the cast iron which surrounds it. Fig. 5 shows a section of the wheel through its diameter, including two of the spokes.

By this mode of enveloping wrought iron or steel skeletons of the shape of the intended article with cast iron, the latter material is not injured in its tenacity, while the former is considerably improved; and the important qualities of toughness and infrangibility are introduced into forms more perfect, and structures more solid, than can be obtained in wrought iron alone; these advantages are likewise obtained at an immaterial increase of cost. As respects its most obvious application, that of wheels to railway carriages, it seems to be just the "one thing needful." We do not see how such wheels can be easily destroyed, and they admit of any degree of stability being conferred upon them at one half or one third the expense of wrought iron. We shall be happy to hear of Mr. Forrester having introduced his patent improvement in the construction of the framing of the roofs of buildings. *Architects will, we think, do well to consult Mr. Forrester on this point.*

XERANOTHLIPTE.—To Jean Jacques Jaquier, of Castle Street, Leicester Square, a patent for "improvements in machinery for making paper, communicated to him by a foreigner, which he denominates *Xeranothlipte*," was granted on the 31st of August, 1831, and the specification was deposited in the Enrolment Office on the 29th of February, 1832.

M. Jaquier prefaces the description of his machinery by stating, that in all the apparatus previously constructed for making machine, or endless paper, with the great wire lines, similar to those in laid paper (or that made in hand moulds), the pressure given to the pulp, to consolidate it, had the effect of cutting the paper through, or into ribands of the width of the spaces between the lines. With the view of obviating such a serious defect in this imitation of laid paper, M. Jaquier conducts the sheet of fresh pulp on the endless wire web over an extended series of horizontal rollers, whence it

passes round the main cylinder without receiving any pressure; but during its extended journey to the main cylinder, it has acquired sufficient consolidation by constant drainage and the shaking of the machine, to be capable of bearing afterwards a slight degree of elastic pressure, which is produced by a small roller under the main cylinder; this roller is covered with several folds of "nappy cloth," partly to prevent its taking the paper off the mould, and partly to confer elasticity and a greater uniformity of pressure against the wires and the intervening paper. The operation of this roller so situated, gives the continuous sheet of paper sufficient strength and tenacity to allow it to be taken off the wire web, which is immediately done by the paper on the wire web being brought into contact with a roller carrying an endless felt of open cloth, to which the paper adheres in preference to the wire work mould. It is then carried forward by the endless felt, when the paper is made to bear against another series of rollers carrying another endless felt: the paper is thus pressed and drained between two cloths, before it is carried between the ordinary pressing rollers, whence it is delivered sufficiently manufactured to pass between the drying cylinders.

This invention appears to be of some practical value, and we should have given a drawing of it, had it not been so negligently and incorrectly specified as to render some parts unintelligible.

The claim relates to the mode of giving pressure to the paper after it has passed under the main cylinder, and to the subsequent pressure between two endless felts.

Capstans.—To Lieut. J. Lehou, R. N. a patent for "an improved method of constructing capstans," was granted on the 10th of January, and the specification was enrolled in the Petty Bag Office on the 10th of March, 1832.

This patentee proposes to employ a teethed wheel of diameter somewhat longer than the capstan head, with a series of pinions, of different sizes and number of teeth, to actuate the capstan. The pinions are to be put in motion by crank or winch handles, which fit upon their axes. The smaller the pinion which is used, of course the greater will be the power of the capstan: when one of the pinions is to be used the others are to be put out of gear, by means of any of the well-known methods of disengaging wheel work.

Any one of the pinions may be used by itself, or in combination with the spoke levers usually employed in working the capstan. It is proposed as a farther improvement to divide the capstan into two parts, that the upper may be used for one purpose, while the lower

is used for another, and they may be turned in the same, or in contrary directions, at pleasure.

Wheel Carriages.—To W. Mason, of Margaret Street, Cavendish Square, Patent Axle-tree Maker, a patent "for improvements in the construction of wheel carriages," was granted on the 10th of August, 1831, and the specification was enrolled in the Enrolment Office on the 10th of February, 1832.

The intention of this patent is to afford the means of turning four-wheeled carriages without diminishing the size of the fore wheels, or cutting recesses into the frame work or body of the carriage for the reception of the wheels in the act of turning. This important object is proposed to be obtained by means of joints in the fore axletree, between the carriage frame and the naves, to allow the ends of the axletree to move horizontally backwards and forwards without altering the position of the middle portion, which remains eminently right across the carriage. At each of the joints and connected with the portions of the axletrees which fit into the naves, is fixed a bar which connects the wheels with the splinter bar, to which it is jointed, so that the middle portion of the axle, the splinter bar, and these two side bars, form a parallelogram, which remains rectangular only, while the carriage is proceeding straight forwards. The pole of the carriage is likewise jointed to the middle of the axle and to the middle of the splinter bar, by which means any change of the position of the pole to the right or left will cause a corresponding change in the position of the levers constituting the before-mentioned parallelogram, and consequently prepare the wheels for turning.

We have not deemed it necessary to enter upon the minute details by which the patentee shows, in his specification, the proportions of the various parts of his arrangement, so as to afford the requisite strength to an axle with vertical joints, as what we have stated will be quite sufficient to give the reader a general idea of the principle and application of the invention.

Filter for Water and other Fluids.—To J. Neville, of Great Dover Street, Surry, Engineer, a patent for "an improved apparatus for clarifying water or other fluids," was granted on the 9th of September, 1831, and the specification was enrolled in the Enrolment Office on the 9th of March, 1832.

Upon the bottom of the tank or cistern containing the water to be filtered, Mr. Neville placed an unglazed earthenware pan, with its mouth downwards. The edges of this pan are scollopped to allow

the water to pass freely; and around this scollopped edge is placed a piece of list, or other similar substance, to prevent the entrance of impurities into the interior vessel, which is to be surrounded and covered over with sand, broken flints, or other similar substances: over these is placed a layer of powdered vegetable charcoal, which has been previously washed to clear it from all impurities. The filtered water is obtained from the interior vessel by means of a pipe which extends from its upper part through the side of the exterior vessel, and descends as low down as the position of the vessels will permit, that the discharge of the filtered water may be aided by the weight of an hydraulic column.

Other modifications of this apparatus are described as applicable to various circumstances and purposes, but they all depend on the same principle.

BUTTONS.—To B. Aingworth, of Birmingham, Button-maker, a patent "for an improvement in the working and constructing of buttons," was granted on the 30th of August, 1831, and the specification was deposited in the Enrolment Office on the 28th of February, 1832.

The specification of this invention is commenced by a minute description, illustrated by drawings, of a method of manufacturing buttons, invented and patented by Mr. B. Saunders, of Birmingham, on the 11th of November, 1813. Then follows a description, likewise illustrated by a series of drawings, of an improved method of manufacturing the same, patented by Mr. Ashton on the 13th of October, 1825. And, lastly, comes the description of the method of making buttons, invented by Mr. B. Aingworth, who contends that by his process of manufacturing the elastic neck-covered buttons may be produced of a better quality, and with greater facility. The buttons in question consist of a disk of metal of the size of the button required; this is provided with one disk of paper before it, and two behind it. These disks are then to be covered with woollen, silk, or other fabric, which must be gathered in behind the button. After this a circular piece of metal with a hole in its centre, through which projects the elastic neck, consisting of a piece of strong woven coarse fabric, projecting about the sixteenth of an inch, is applied. The back piece is serrated round its circumference, and the projecting teeth are forced down and turned in by means of a press, and this secured together all the parts of the button. Now the improvement which the present patentee proposes to introduce, consists in making the back piece with the hole in its middle plain, instead of serrated, and covering the exterior side of it with cloth; and fasten-

ing the different parts of the bottom together by means of the front disk, which is made larger than the intended button, and then by means of a press its edges are turned back, and folded in with the covering upon it; and by this means he states that he gets a flatter button, which will lay closer to the garment to which it may be applied.

AMERICAN PATENTS.

Specification of a Patent for an Improvement in the manufacturing of Ropes. Granted to Edward S. Townsend *and* Philo Durfee, *Palmyra, Wayne county, New York, January* 6, 1831.

This machine is composed of a shaft, or reel, used in place of a wheel or crank, to give the twist or turn for laying strands or rope; so that a strand or rope can be twisted or laid in certain lengths at a time, until a rope or strand is twisted or laid of any required length. The shaft to be fixed to revolve on proper supports, (in boxes, or gudgeons, &c.) made of proper materials, with a hole passing into the side and out at the end, so that when a rope or strand is coiled on the shaft, the end of it can pass through the eye thus made in the end of the shaft, not interfering with the supports; thus giving a chance for spinning to it another length of yarn; then the shaft being turned, gives the turn for the laying of strands or rope, which, when so laid, is again to be reeled, leaving the rope out as before: thus on-laying, and spinning, until any required length is finished. The chief object is to make a rope of any assignable length in one piece, by laying it in portions of convenient length, and spinning into the threads of the end of such parts as is already laid. In laying several ropes into a layer, or tarred yarn into a rope, the reels or machines must be equal to the number of strands and rope, and may remain stationary, or be placed on slides, or truck wheels, as may be necessary.

Edward S. Townsend,
Philo Durfee.

[A drawing illustrative of the foregoing invention was given in Pl. IV. fig. 1, in our last number, where A represents the shaft; B the rope passing out at the end of the shaft.]

Specification of a Patent for an Improvement in the mode of making Harrows for the purposes of agriculture, called Revolving Harrows. Granted to Samuel Rugg, *Lancaster, Worcester county, Massachusetts, January* 11, 1831.

This improvement in the harrow is more particularly described as follows, and I refer to the drawings of the same accompanying

this specification, and the model deposited in the office, for a more complete and full understanding of the improvement.

In the drawing, fig. 6, Pl. VI. A, A, are two horizontal bars forming a triangle, and joined at B.

B, is the forward part of the harrow.

C, C, the junctions of the bars at the other end of the frame and with A, A, and B, constituting the whole frame.

D, a brace running from B, to a middle point between C, C, and is also extended as a runner when the harrow is turned over on its back, for the purpose of being drawn over the ground without obstruction.

E, E, are two cylindrical rollers which come near together at the point F, and revolve at each end on their axes. These cylinders diverge till they reach the part of the frame C, C, where they are inserted, and may be made to constitute, at pleasure, either a greater or less angle than A, A.

a, a, a, &c. are iron teeth, part of which are visible in the drawings. These teeth are mortised into the rollers, the same number in each roller, and pass entirely through, and have sharp edges, with backs, resembling in some degree the blades of penknives, and varying in size with the size of the rollers and frame. These teeth may be grooved, or made concave on one side, or may be of plain surfaces.

b, b, b, &c. some of which are visible in the drawing, are pieces of iron inserted in A, A, and extending downward towards the rollers, for the purpose of clearing them from sods, earth, or other obstructions.

The mode in which this harrow is worked is as follows. The power is applied at the end near to B. The rollers are thus immediately put in motion, and continue revolving in opposition to each other; that is, revolving in opposite directions, and outwardly from the frame on either side. This improved harrow is very useful in cross furrowing, and particularly so in subduing rough land, and soils that are stubborn, either from roots, or otherwise; and breaks up and mellows the land with great advantage. It is also easier for draft than the common harrow of the same size.

The principle to be secured is the revolving principle as applied to the harrow. The form is of less consequence. The petitioner contemplates the use of his improved harrow in other forms; for instance, the bars A, A, may be brought nearer together than C, C, or may be entirely removed, and D only retained. E, E, may be made to diverge more or less, or work in parallel lines, and revolve either way by varying the form of the teeth; and a single roller may be used with a handle at the end opposite to the draft, for light harrowing, or cross furrowing. SAMUEL RUGG.

Specification of a Patent for an Improvement in Tanning. Granted to OSMOND COGSWELL, *Cincinnati, Hamilton county, Ohio, January* 29, 1831.

THE improvement consists in applying a solution of oak or other bark to hides or skins, in such manner, as that when the glutinous particles of the hide have absorbed and become mixed with the tanning, or astringent principle, the other part of the solution (viz. the water, may pass off and leave the hide free to receive more of the solution, and so on till it is tanned. The object is to expedite the process of tanning, and consequently to diminish the amount of capital necessary to be employed in the business.

The *apparatus, and mode of application* is as follows. Make a frame of timber of a square form; the width to be made as great as the width of the hides, parts of hides, or skins, that are to be tanned; the height and length to suit convenience. Near the bottom, or ground of said frame, a tight floor is to be formed of the length and breadth of the frame; said floor to incline to one side so as to carry off the liquor after it has passed through the hide; the sides and ends to be raised from two to four inches above the floor, by fastening strips of plank on the inside of the frame; this will appear like a box; say four feet wide, two inches high on one side, and four on the other, and twenty feet long; (these boxes may be fixed one above another, about twelve inches apart to the top of the frame;) said boxes to be filled with *saw dust*, or any other soft porous substance, that will not prevent the solution from running through the hide, and at the same time absorb and carry it off after it has passed through. On this surface, (of saw dust,) the hides, sides, or skins, (after having been prepared in the usual mode for tanning, except that the flesh is to be taken off clean,) are to be smoothly spread out, and in order to keep on them a sufficient quantity of the solution, make sacks of coarse cotton or other cloth, an inch or more in diameter; fill them with the same material that the boxes are filled with, and place them around under the edges of the hides, which will raise said edges equal to the diameter of the sacks. After this is done, pour on the hides as much of the solution as the hollow surface which they will then present will hold, and continue to fill them up as it runs off through the pores of the hide, for the space of from three to fifteen days, (the time in proportion to the thickness of the hide or skin,) in which time they will be tanned, except the extreme parts or edges, which cannot be brought so fully under this process as the other parts of the hides: and in order *perfectly* to tan *them*, it is necessary to lay them in vats after the common mode, for three or four weeks. OSMOND COGSWELL.

For an improvement in Distilling. JOHN CAIROU, *city of New York, January* 10, 1831.

THIS apparatus is intended to produce highly rectified spirit at one operation. The vapour, as it rises from the still, passes through

successive receivers, like kettles placed upon each other. The portion which is condensed in each dropping through a tube back into the vessel below it. After escaping from these, the vapour passes through a horizontal worm; each coil of this worm has a tube leading down from its lower part, into a common tube, to conduct that portion of the spirit off, which is less highly rectified than that which passes through the worm; this latter is finally condensed in the usual way. The parts intended to be claimed appear to be those which allow of the escape of the less pure spirit in its progress towards the final condensing tub.

For an improvement in the Mode of Curing Tobacco. Tyre G. Newbold, *Franklin County, Virginia, January* 11, 1831.

The improvement proposed is, "after having a tight house in which the new cut tobacco is to be hung, build a furnace at a convenient distance from the walls of said house, and have a funnel extending on the ground from said furnace through the house, and turning back discharge the flame and smoke in the open air, at a convenient distance from the building. The furnace and funnel to be made of brick, stone, or other incombustible material.

For an Instrument for the Teaching of Geography. Elizabeth Oram, *city of New York, January* 12, 1831.

As this instrument is the invention of a lady, we will, of course, allow her to tell her story in her own way, without any animadversions of ours, which might mar the narrative, or involve us in inextricable difficulties.

"Be it known, that I, Elizabeth Oram, of the city of New York, have invented a new and useful instrument for the teaching of geography, and that the following is a full and exact description of the construction and use thereof as invented by me.

"It consists of a globe, upon which the surface of the earth is represented by various heights, as they exist in nature. By this the distinction between land and water is clearly seen. The various ranges of mountains, with their relative heights exhibited; and their influence upon heat and productions, with their geological structure.

"By means of a magnet inserted in the surface of the improved globe, the great principle of attraction may be clearly shown, by affixing thereto any small iron figure.

"This globe is surrounded by the principal circles of the sphere. The ecliptic is elevated, by means of which, and a moveable and illuminated sun, the manner in which the earth receives its rays, and the causes of seasons, may be clearly exhibited. On the horizon there is affixed a small instrument, by which the causes of eclipses are shown.

"A moveable star, brings to the comprehension of pupils the nature of right ascension, declination, celestial latitude and longitude."

ELIZABETH ORAM.

For improvements in Navigation, and in the application of Steam, Men, Animals, or other Natural Agents, thereto. WILLIAM W. VAN LOAN, *city of New York, January* 15, 1831.

THE essential feature of this plan is the passing of an endless chain of paddles over drums, in order to operate upon the water, in place of the ordinary paddle wheel. In this, taken simply, there is nothing new; but there are some particulars in which the plan proposed lays claim to originality.

The drums over which the endless chain passes are to be air tight, hollow cylinders, and each of the paddles, or keels, as they are called in the specification, is attached to a buoyant, hollow, water-tight vessel, running its full length. At fig 7, Pl. VI. the ends of the chain of paddles are shown passing round one of the drums, *a a* being the air-tight vessel, and *b b* the keels, or paddles.

The patentee says, that "in order to the more clear and full understanding of my invention, I further declare and set forth, that it rests upon the following principles:

"1st. In substituting for the paddle wheels, or other usual propelling apparatus, an endless chain of empty water-tight vessels, made to revolve upon appropriate drums or wheels, by steam, or any other prime mover whatever.

"2nd. In substituting for the buoyancy of the hull of a boat, or ship, the buoyancy of the immersed part of the endless chain of vessels, or when necessary, of hollow drums, or cylinders, or prisms, and the carrying forward any load they may bear, free from any resistance but that which they themselves experience. By these means getting wholly rid of the rapidly increasing resistance that fluids present to motion through them. I retain only a resistance whose measure is independent of velocity, and have thus in my power, theoretically, to obtain unlimited velocities: and, in practice, velocities limited only by the power of the prime mover that may be applied to the apparatus."

It is proposed to apply the same principle of buoyancy to the paddle wheels of team and steam-boats, as an additional security against their foundering.

For an improved Knife for Cutting Tobacco. JAMES J. MAPES, *city of New York, January* 22, 1831.

THE claim is as follows:

"The invention here claimed, and desired to be secured by letters patent, is the above-described case or stock, with the moveable steel blade, which can be renewed when worn, from time to time; the

case remaining the same; whereas in the common method the knife is made all of one piece, and when the steel is worn the whole knife must be thrown aside."

The contrivance is something like that of a double-ironed plane, that is, the cutting knives of tobacco machines are to be made to set forward by means of screws tightening them upon slats.

For a Bevel Wheel Plane, for Planing Boards, &c. Jonathan Newhall, *Washington, Lincoln county, Maine, Jan.* 25, 1831.

Plane irons are fitted into the rim of a wheel, so as to cut on one face of it. Four, six, or any other number of irons may be used. The shaft of the wheel is to run in collars behind the cutting side, so as to leave the face unobstructed. The shaft has a sliding motion in the collars, to adapt it to stuff of different thicknesses. The wheel may be three feet in diameter, and its face is to be bevelled, so as to take off about half an inch on the edge, and to extend to two inches, or upwards, upon the face, according, as we suppose, to the width of the irons. The mouths of the planes may be made more or less open by means of plates of iron let in flush, but capable of sliding, so as to close the mouth when desired. These, of course, are to be tightened by suitable screws.

The timber is fixed upon a suitable carriage, and is to be moved along by a rack and pinion, or otherwise.

The claims are to " the bevel on the face of the wheel, the use of which is to admit the lumber to enter between the carriage and the verge of the wheel, and thereby present the part to be planed off to the action of the planes.

" The sliding motion of the wheel, by which various thicknesses may be planed.

" The running the lumber by the centre, and the metallic plates, the use of which is to answer the purpose of double irons, [by closing the mouths], which principle is contemplated to be applied to hand planes."

For an improvement in the composition of Matter used in stiffening wool and fur hats and caps, by the use of Indian Rubber (elastic gum), either in combination with gum shellac, or alone. Laban L. Macomber, *Gardiner, Kennebeck County, Maine, Jan.* 19, 1831.

Be it known that I have invented a new and useful improvement in the composition of matter to be used in stiffening wool and fur hats and caps, by which they are rendered so elastic as to be folded into a small compass, and packed with clothes in the trunk of the traveller, or elsewhere, as convenience may require; after which they can be made to resume and keep their original shape; by using elastic gum (Indian rubber), either in combination with the

gum shellac, or alone. If used with shellac, I dissolve the elastic gum in spirits of turpentine, or any other suitable solvent, and the shellac in alcohol, or any other agent proper to dissolve the same. If used alone, I dissolve the elastic gum aforesaid in spirits of turpentine, or other solvent.

What I claim as my invention is, the use of gum elastic, either alone, or in combination with gum shellac, as aforesaid, in stiffening wool and fur hats and caps, so as to render them elastic to such a degree that they may be folded and packed, and then restored to their usual shape aforesaid, and also to render them water proof.

LABAN L. MACOMBER.

STEAM CARRIAGES ON THE COMMON ROAD.

IN our last volume (pages 211 and 241) we inserted a considerable portion of the evidence given before a Committee of the House of Commons during the last Sessions on the above-mentioned subject. The whole of the evidence together with the *Report of the Committee* being now before us, we propose to give as many extracts from it as we think are likely to interest our readers. We shall commence with the Report.

The Committee proceeded, in the first instance, to inquire how far the science of propelling carriages on common roads, by means of steam or mechanical power, had been carried into actual operation; and whether the result of the experiments already made had been sufficiently favourable to justify their recommending to the House that protection should be extended to this mode of conveyance, should the tolls imposed on steam carriages, by various local Acts of Parliament, be found prohibitory or excessive.

In the progress of this branch of their inquiry, they have extended their examination to the several points on which the chief objection to this application of steam have been founded, viz. the insecurity of carriages so propelled, from the chance of explosion from the boiler, and the annoyance caused to travellers on the common roads, either by the peculiar noise of the machinery, or by the escape of smoke and waste steam, which were supposed to be inseparable accompaniments.

It being also in charge to the Committee, "to report upon the proportion of tolls which should be imposed upon steam carriages," they have examined several proprietors of those already in use, as to the effect produced upon the surface of the road by the action of the propelling wheels.

As this was too important a branch of their inquiry to rest entirely on the evidence of individuals, whose personal interests might have biased their opinions, the Committee also examined several scientific engineers, by whose observations on the causes of the ordinary wear of roads they have been greatly assisted.

The Committee were also directed to report on "the probable utility which the public may derive from the use of steam carriages." On this point they have axamined a Member of the Committee, well known for his intelligence and research on subjects connected with the interests of society, and they feel that they cannot fulfil this part of their instructions better than by merely referring the House to the evidence of Colonel Torrens.

These inquiries have led the Committee to believe that this substitution of inanimate for animal power, in draught on common roads, is one of the most important improvements in the means of internal communication ever introduced. Its practicability they consider to have been fully established; its general adoption will take place more or less rapidly, in proportion as the attention of scientific men shall be drawn by public encouragement to further improvement.

Many circumstances, however, must retard the general introduction of steam as a substitute for horse power on roads. One very formidable obstacle will arise from those prejudices which always beset a new invention, especially one which will appear at first detrimental to the interests of so many individuals. This difficulty can only be surmounted by a long course of successful, though probably unprofitable, experiments. The great expense of the engine must retard the progress of such experiments. The projectors will, for a long period, work with caution, fearing not only the expense incurred by failure, but also that too sudden an exposure of their success would attract the attention of their rivals. It would be difficult to exemplify to the House how small, and apparently unimportant, an adaptation of the parts of the machinery, or of the mode of generating or applying the steam, may be the cause of the most rapid success; yet he who by a long course of experiment shall have first reached this point, may be unable to conceal the improvement, and others may reap the benefit of it.

* * * * * *

The first *extensive* trial of steam as an agent in draught on common roads, was that by Mr. Gurney, in 1829, who travelled from London to Bath, and back, in his steam carriage. He states, that although a part of the machinery which brings both the propelling wheels into action, when the full power of the engine is required, was broken at the onset, yet that on his return he performed the last 84 miles, from Melksham to Cranford Bridge, in 10 hours, including stoppages.* Mr. Gurney has given to the Committee very full details of the form and power of his engine, which will be found in his evidence.

The Committee have also examined Messrs. Summers and Ogle, Mr. Hancock, and Mr. Stone, whose steam carriages have been in daily use, for some months past, on common roads.

* * * * * *

* Quere—Were these "ten hours" ten *consecutive* hours? There is ground for suspicion, when the important fact is suppressed, that the fuel and water was drawn in a separate carriage *by horses*.—Ed.

Besides the carriages already described, Mr. Gurney has been informed, that from "twenty to forty others are being built by different persons, all of which have been occasioned by his decided journey in 1829."*

*   «   *   *   *   *

Mr. Gurney states, that he has kept up steadily the rate of 12 miles per hour; that "the extreme rate at which he has run is between 20 and 30 miles per hour."

Mr. Hancock "reckons, that with his carriage he could keep up a speed of 10 miles per hour, without injury to the machine."

Mr. Ogle states, "that his experimental carriage went from London to Southampton, in some places, at a velocity of from 32 to 35 miles per hour.

"That they have ascended a hill, rising 1 in 6, and 16½ miles per hour, and 4 miles of the London road, at the rate of 24½ miles per hour, loaded with people.

"That his engine is capable of carrying 3 tons weight, in addition to its own."

Mr. Summers adds, "that they have travelled in the carriage at the rate of 15 miles per hour, with 19 persons on the carriage, up a hill 1 in 12.

"That he has continued for 4½ hours to travel at the rate of 30 miles per hour.

"That he has found no difficulty of travelling over the worst and most hilly roads."

Mr. James Stone states, that "36 persons have been carried on one steam carriage.

"That the engine drew 5 times its own weight nearly, at the rate of from 5 to 6 miles per hour, partly up an inclination."

The several witnesses have estimated the probable saving of expense to the public, from the substitution of steam-power for that of horses, at from one-half to two-thirds. Mr. Farey gives, as his opinion, "that steam coaches will very soon, after their first establishment, be run for one-third of the cost of the present stage coaches."

Perhaps one of the principal advantages resulting from the use of steam, will be, that it may be employed *as cheaply at a quick as at a slow rate,*† "this is one of the advantages over horse labour which becomes more and more expensive, as the speed is increased. There is every reason to expect, that in the end the rate of travelling by steam will be much quicker than the utmost speed of travelling by horses; in short, the safety of travellers will become the limit to speed." In horse-draught the opposite result takes place; "in all cases, horses lose power of draught in a much greater proportion than

* We think it is susceptible of proof, that there were more steam carriages building prior to Mr. Gurney's said journey, than subsequently to it. Our patent lists will afford collateral evidence of this fact.—Ed.

† The quantity of power (expenditure of steam) required to propel a carriage a given distance is *considerably less* at a high velocity than a low one. We believe that the total expenditure of power will be found to be in the *inverse ratio of the velocity.*—Ed.

they gain speed, and hence the work they do, becomes more expensive as they go quicker."

* * * * * *

Every witness examined has given the fullest and most satisfactory evidence of the perfect controul which the conducter has over the movement of the carriage. With the slightest exertion they can be stopped or turned, under circumstances where horses would be totally unmanageable.

* * * * * *

The boilers expose a very considerable surface to the fire, and steam is generated with the greatest rapidity. From their peculiar form, the requisite supply of steam depends on its continued and rapid formation; no large and dangerous quantity can at any time be collected. Should the safety-valve be stopped, and the supply of steam be kept up in greater abundance than the engines require, *the explosion may take place, but the danger would be comparatively trifling from the small quantity of steam which could act on any portion of the boilers.* § As an engine, invented by Mr. Trevithick, has not been as yet applied to carriages, the Committee can do no more than draw the attention of the House to the ingenuity of its contrivance. Should it in practice be found to answer his expectations, it will remove entirely all danger from explosion. In each of the carriages described to the Committee, *the boilers have been proved to a considerably greater pressure than they can ever have to sustain.* §§

* * * * * *

The danger arising to passengers from the breaking of the machinery need scarcely be taken into consideration. It is a mere question of delay, and can scarcely exceed in frequency the casualties which may occur with horses.

It has been frequently urged against these carriages, that where-ever they shall be introduced, they must effectually prevent all other travelling on the road; as no horse will bear quietly the noise and smoke of the engine.

The Committee believe that these statements are unfounded. Whatever noise may be complained of, arises from the present defective construction of the machinery, and will be corrected as the makers of such carriages gain greater experience. Admitting even that the present engines do work with some noise, the effect on horses has been greatly exaggerated. All the witnesses accustomed to travel in these carriages, even on the crowded roads adjacent to the metropolis, have stated that horses are very seldom frightened in passing. Mr. Farey and Mr. Macneil have given even more favourable evidence in this respect of the little annoyance.

No smoke need arise from such engines. Coke is usually burned in locomotive engines, on railways, to obviate this annoyance, and those steam carriages which have been hitherto established also burn

§ We do not question the perfect safety of these boilers; but the Committee should have explained how the explosion would be produced if the pressure could not effect it?—*See* §§.

it. Their liability to be indicted as nuisances will sufficiently check their using any offensive fuel.

There is no reason to fear that waste steam will cause much annoyance. In Mr. Hancock's engine it passes into the fire; and in other locomotive engines it is used in aid of the power by creating a quicker draught and more rapid combustion of the fuel. *In Mr. Trevithick's engine it will be returned into the boiler.*

*The Committee not having received evidence that gas has been practically employed in propelling carriages on common roads, have not considered it expedient to inquire** as to the progress made by several scientific persons who are engaged in making experiments on gases, with the view of procuring still cheaper and more efficient power than steam.

The Committee having satisfied themselves that steam has been successfully adopted as a substitute for horse-power on roads, proceeded to examine whether tolls have been imposed on carriages, thus propelled, so excessive as to require legislative interference, and also to consider the rate of tolls by which steam carriages should be brought to contribute in a fair proportion, with other carriages, to the maintenance of the roads on which they may be used.

They have annexed a list of those local Acts in which tolls have been placed on steam or mechanically propelled carriages.

Mr. Gurney has given the following specimens of the oppressive rate of tolls adopted in several of these Acts :—On the Liverpool and Prescot road, Mr. Gurney's carriage would be charged £2. 1*s*., while a loaded stage coach would only pay 4*s*. On the Bathgate road, the same carriage would be charged £1. 7*s*. 1*d*., while a coach drawn by four horses would pay 5*s*. On the Ashburnham and Totness road Mr. Gurney would have to pay £2., while a coach drawn by four horses would be charged only 3*s*. On the Teignmouth and Dawlish roads this proportion is 12*s*. to 2*s*.

Such exorbitant tolls on steam carriages can only be justified on the following grounds :—

First, because the number of passengers conveyed on, or by, a steam carriage, will be so great as to diminish (at least to the extent of the difference of the rate of toll) the total number of carriages used on the road; or, secondly, because steam carriages induce additional expense in the repairs of the roads.

The Committee see no reason to suppose that, for the present, the substitution of steam carriages, conveying a greater number of persons than common coaches, will take place to any very material extent; and as to the second, of increased charge, the trustees, in framing their tolls have probably not minutely calculated the amount of injury to roads likely to arise from them.

The Committee are of opinion that the only ground on which a fair claim of toll can be made, on any public road, is to raise a fund,

* The same reasoning equally applies to Mr. Trevithick's untried plans, which have not, we believe, been "practically employed in propelling carriages;" the principle of them has been repeatedly suggested, but the economy of their application to locomotion hitherto doubted.—Ed.

which, with the strictest economy, shall be just sufficient—first, to repay the expense of its original formation; and, secondly, to maintain it in good and sufficient repair.

Although the Committee anticipate that the time is not far distant when, in framing a scheme of toll for steam carriages, their general adoption, and the great number of passengers which will be conveyed on a small number of vehicles, will render it necessary not only to consider the amount of injury actually done to the road, but also the amount of debt which may have been increased for its formation or maintenance; yet at present they feel justified by the limited number of such carriages, and by the great difficulties they will have to encounter, in recommending to the House, that in adopting a system of toll, the proportion of "wear and tear" of roads by steam, as compared with other carriages, should alone be taken into consideration.

Unless an experiment were instituted on two roads, the one reserved solely for the use of steam coaches, the other for carriages drawn by horses, for the purpose of ascertaining accurately the relative wear of each, it would be quite impossible to fix with certainty the proportion of toll to which, on the same road, each class of vehicles should be liable. To approximate, however, as near as possible to the standard of relative wear, the Committee have compared the weights of steam carriages with those of loaded vans and stage coaches. They have tried to ascertain the causes of the wear of roads; also the proportion of injury done by the feet of horses, and the wheels of coaches; how far that injury is increased by the increased velocity; and also in what degree the wear of roads by loaded carriages may be decreased by any particular form of wheel.

Mr. Macneil estimates that the feet of horses drawing a fast coach, are more injurious to the roads than the wheels, in the proportion of 3 to 1 nearly; that this proportion will increase with the velocity; that by increasing the breadth of the tires of the wheels, the injury done to roads by great weights may be counteracted. He considers that on a good road, one ton may be safely carried on each inch of width of tire of the wheels.

Mr. M'Adam and Mr. Telford have given corresponding evidence as to the greater wear caused by horses feet than by the wheels of carriages.

Each of the above witnesses agrees, that adding the weight of the horses to that of the coach, and comparing the injury done to a road by a steam carriage of a weight equal to that of the coach and horses (the wheels being of a proper width of tire), the deterioration of the road will be much less by the steam carriage than by the coach and horses.

As to the injury to roads, which has been anticipated from the "slipping" of the wheels, it may safely be left to the proprietors to correct; the action of the wheel slipping involves a waste of power, and a useless expenditure of fuel, which, for their own sakes, they will avoid.

Apprehension has also been entertained, that although the action

of wheels may not be peculiarly injurious, yet that, from the great power which may be applied, if the steam were worked at very high pressure, or if the size of the engine were increased, greater weight might be carried than the strength of the road could bear.

Undoubtedly in proportion to the advance of the science, will be the increase of weight drawn by an engine with a given expenditure of fuel; but there are many practical difficulties to be surmounted before the weight so drawn can reach the point when it would be destructive of roads. There are no theoretical reasons against the extension of the size of the engines. The difficulties, according to Mr. Gurney, are of a practical nature, and only in "the difficulty of management of a large engine." In proportion as we augment the power of the engines, we must increase their strength, and consequently their weight; the greater weight will be a material diminution of efficiency. To a certain extent the power may be increased in a greater ratio than the weight; but, with our limited knowledge of the application of steam, and with the present formation of the public roads, the point will be very soon attained, when the advantage of increased power will be counterbalanced by the difficulties attendant on the increased weight of the engines.

The Committee believe, that to propel by steam-power weight would be injurious to roads, even with the best system of wheels and division of the load, could not, at present, be attempted with any prospect of advantage to the proprietors. The weight of the steam carriages at present in use vary from 53 to 80 cwt.: but it must be recollected that they are mere models; they were made with attention to strength only, to bear the uncertain strain to which they would be exposed in the course of experiments, and a very considerable diminution of weight may be anticipated.

* * * * * *

It appears of little importance, so far as relates to the engine, whether the requisite amount of friction be spread over a broad surface of tire, or be concentrated to a small point; but as the wheels by being too narrow, would have a tendency to bury themselves in every soft or newly-made read, and thus raise a perpetual resistance to their own progress, it actually becomes an advantage to adopt that form, which is least injurious to the road. The proprietors, who have been examined on this point, seem to be quite indifferent as to the breadth of tire they may be required to use.

[The Report then proceeds to consider the subject of tolls, and the various modes suggested to them for levying it, the objections to which each of them are liable, and concludes that portion of their task with the following suggestions to the House.]

The Committee feel that, however strong their conviction may be of the comparatively small injury, which properly constructed steam carriages will do to the roads, yet this conviction is founded more on theory, and perhaps what may be considered as interested evidence, than practical experience; they would, therefore, recommend, that the House should not make, at present, any permanent

regulations in favour of steam. The experience which will be gained in a few years, will enable the Legislature to form a more correct judgment of the effect of steam carriages on roads than can now be made. They, therefore, recommend that the tolls imposed on steam carriages by local Acts, where they shall be unfavourable to steam, shall be suspended during three years; and the trustees shall be permitted to charge only according to the rate which the Committee have agreed to.

The House will have perceived, in the former part of this Report, that there are two modes of applying steam in lieu of horses in draught; one, where the engine and passengers are on the same carriage; the other where the engine is placed on separate wheels, and is merely used to propel or draw the carriage. Although the difference of weight may be in favour of the former mode, yet, as on the latter, it is divided over eight wheels, instead of four, its small excess cannot justify a larger toll being imposed, as it will be found much less injurious to the roads. The Committee, therefore, recommend, that in charging toll, the engine-carriage and carriage drawn shall be considered but as one.

* * * * * *

The Committee have divided steam carriages (intended for passengers) into two classes, to be subject to different rates of toll. The first is, where the carriage is not plying for hire, or where, if plying for hire, it shall not be calculated for, or carry at any time, more, than six passengers. In the first place, the original cost of such machines, and the expense of working them, will sufficiently protect the roads from any great number of merely experimental carriages; and for the same reason they will not, probably, be of a weight or size likely to be injurious.

* * * * * *

In the second class they have placed all other steam carriages (except those travelling at slow rates for goods only.) This may at first appear unjust, from the supposed power of steam to draw almost unlimited weight. The Committee have already enumerated the difficulties hitherto encountered in attempting to propel very heavy loads on turnpike roads. They are such as to discourage the expectation that within any short period of time, the system will have been so perfected as to give rise to any inconvenience from this scource; should any hereafter be found, it will then be sufficient to remedy the defect. Until a due proportion of the parts of the machinery shall have been ascertained, the makers of these carriages will vary but cautiously from the models at present in use. Their object will be, for some time, the perfecting of them, rather than the uncertain experiment of increasing their size.

The Committee do not anticipate, that for a considerable period, steam will be used as a propelling power on common roads for heavy waggons. It appears to have been the general opinion of the witnesses, that in proportion as the velocity of travelling by steam on common roads in an ascent is diminished, the advantages of steam over horse power are lost. The efficiency of horses in draught is

rapidly diminished as their speed is increased; while, on the contrary, the weight, which could be carried or propelled, at any given velocity, by steam, could not be more cheaply conveyed, were the speed decreased to that of the slowest waggon.

As speed, therefore, is the cause of greatly increased expense, where horses are used, while with steam it is comparatively unimportant, it is probable that the latter will be chiefly resorted to when rapidity of conveyance is required. Mr. Gurney considers, that under four miles per hour, horses can be used in draught more economically than steam. Should it, however, be deemed profitable to convey heavy goods by steam carriages, the Committee recommend that there should be as little interference as possible with the number of carts employed, as the effect on the surface of roads would be infinitely more injurious if heavy loads were placed on a single cart, than if the same weight were divided over several. The Committee recommended, that where carriages containing heavy goods alone, are propelled by steam, the weight of the load should be charged, without reference to the number of carts on which it may be carried.

As a horse can draw from 20 to 40 cwt. on roads, they propose that each 20 cwt. of load conveyed in a steam carriage, should be chargeable at the same rate of toll as one horse drawing a cart.

A charge on weight is not so objectionable where goods are conveyed at a slow rate, as when speed is alone required.

In conclusion, the Committee submit the following Summary of the Evidence, given by the several Witnesses, as to the progress made in the application ef Steam to the purposes of draught on common roads.

Sufficient evidence has been adduced to convince your committee—

1. That carriages can be propelled by steam on common roads at an average rate of ten miles per hour.
2. That at this rate they have conveyed upwards of fourteen passengers.
3. That their weight, including engine, fuel, and water, and attendance, may be under three tons.
4. That they can ascend and descend hills of considerable inclination with facility and safety.
5. That they are perfectly safe for passengers.
6. That they are not (or need not be) if properly constructed, nuisances to the public.
7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses.
8. That as they *admit* of greater breadth of tire than other carriages, and as the roads are not acted on so injuriously by the feet of horses in common draught, such carriages will cause less wear of roads than the ordinary vehicles, drawn by horses.
9. That on some roads tolls have been imposed, which would be prohibitory of their being used.

To the Editor.

SIR,—I HAD heard of the patent invention for "an improved mode of introducing air into fluids," by Messrs. Sharp and Fawcett, but had never seen it; when a few days since I met with the diagram, and abstract of the specification in Part XLVII. of your Journal,

You state that it is a combination of the two methods of accelerating evaporation by forcing a current of air under the liquid, and by mechanical agitation; but although I can understand, how the alternating motion of the tubular arms will agitate the fluid in which they are immersed, I am so dull as not to comprehend, by what principle the air is to enter the holes at the upper end of the perpendicular tube, descend through it, displace the fluid in the tubular arms, and force its way out of them against the weight of the superincumbent stratum of liquid.

As you invite discussion on the subject, I am in hopes that one of your correspondents will give me the desired information.

You allude to some experiments given in one of your preceding volumes, p. 45, which I recollect to have seen; but they then appeared to me to omit some very important details, such as precise data of time, bulk, degrees of temperature, description of the mechanical agitating apparatus, and of the blowing machines, &c., all which are necessary to make the results of comparative experiments satisfactory and conclusive. The results you give, such as they are, differ materially from those made by Messrs. Farey, Gill, and other scientific men, for the purpose of ascertaining the effect of Kneller's evaporating process, the powerful effect of which must no doubt be ascribed principally to the brisk agitation caused by the injection of so many streamlets of air; but it may be allowed to inquire whether, and to what extent, other causes act to the same end, as it has been ascertained that the injection of hot air is much less efficient than that of cold air. Is this to be explained merely by the greater rarity of hot air, or to the circumstance that cold air issuing into the hot fluid expands and absorbs in its increased bulk a considerable portion of the steam on its passage to the surface?

It appears that Kneller's object is not so much the acceleration of evaporation, as effecting it at a temperature considerably below the boiling point of the fluid.

I am, Sir, your humble Servant,

London, 6*th March*, 1832. EXPERIMENTALIST.

TO OUR CORRESPONDENTS.

Mr. GOMES may see an apparatus for boring the earth at our Publisher's; where he will also receive a verbal answer to his other queries.

We have not room for the article on Cholera Morbus; the writer had better send it to the newspapers.

We are obliged to postpone the List of New Patents until our next Number.

PATENTS ENROLLED BETWEEN 10TH MARCH, AND 10TH APRIL, 1832.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

SHIPWRECKS, SAVING LIVES FROM.—To Henry Hope Wernninck, of North Terrace, Camberwell, Surrey, Gentleman, a patent "for improvements in apparatus or methods of preserving lives of persons and property when in danger by shipwreck, by speedily converting boats or small vessels of ordinary description into life boats, and other apparatus or means applicable to the same objects," was granted on the 24th of September, 1831, and the specification was lodged in the Enrolment Office on the 24th of March, 1832.

This invention, which is said to be the communication of a foreigner residing abroad, consists in various methods of making and applying buoyant apparatus. The patentee first describes the method of manufacturing a buoyant balloon, made of a series of fifty or a hundred bullocks' bladders, which are to be cleaned and prepared by removing carefully the necks, and portions of fat which may be left adhering to them, turning them, and oiling well with linseed oil on both sides, then filling them with air, and securing well the aperture through which they have been filled by the introduction of a short wooden pipe, and a well fitted plug. The bladders are then to be attached to a hoop of an appropriate size, according to the weight which they are intended to carry ashore. Over this hoop and these bladders is placed an egg-shaped canvas bag, preserved in its distended form by means of a light cane basket. A bladder is also used, after having been prepared as above, for conveying a letter from a ship in distress to the shore. In this case the wooden pipe which is inserted into the neck of the bladder, is made sufficiently large to admit a letter rolled up. The aperture is then securely plugged up, and the apparatus committed to the water, on which it will float with a velocity nearly equal to that of the wind. This it is contended may be frequently the means of conveying to the persons on a lee shore, or to those on board other vessels to the leeward of the one in distress, intelligence in time for relief to be afforded.

Another method of making buoyant apparatus is described in this specification to consist of Dutch or other light rushes, or similar substances cut into appropriate lengths, according to the size and form of the intended apparatus. They are then to be

tied securely together, covered with strong brown paper or pasteboard, or both, moistened and pasted so as to prevent the passage of air: after this a covering of bladder is applied, and the parts of which it is composed are securely cemented together; and, lastly, a canvas covering is to be applied, and the whole secured by resinous varnish and coal tar, so as to render the apparatus impervious to water.

Amongst the numerous instances which the patentee furnishes of the application of the buoyant bunches of rushes, are their introduction round the edge, over and under the seats of a common boat, to convert it into a life-boat, to a man's person in the form of a floating jacket or dress, to render him buoyant in the water, or round his waist, in the form of a large annulus or collar; and, lastly, it is proposed, that a horse shall be surrounded with a buoyant dress reaching nearly as low as the feet of the rider, so that the animal may be enabled to float on the water, without being at all sensible of either his own weight or that of the rider.

WATER, PURIFYING.—To Mark Casnahan, of the Isle of Man, Esq., a patent "for certain improvements in apparatus, modes, or process, of converting sea or salt water, and also other brakish or impure waters into purified or fresh water, which apparatus, modes, or processes, or parts thereof may be applicable to other purposes," was granted on the 20th of September, 1831, and the specification was lodged in the Enrolment Office on the 20th of March, 1832.

The method of purification proposed by this patentee is by a process of distillation, and the apparatus which he describes for that purpose consists of a boiler surrounding the fire, as is customary in ship-hearths, from the upper part of which proceeds a pipe to convey the vapour as it is generated in the boiler to a condenser, where it is converted into water again, and then conveyed to a small box or vessel, situated immediately over the fire within the boiler. Here the distilled water is permitted to boil that its *impurities* may be driven off, when it may be drawn off and preserved for use, either in culinary operations, or as a beverage at table.

It is difficult to conceive the utility of the last part of the process, unless it be for the purification of water containing impurities of greater volatility than the water itself, a circumstance we should apprehend but of rare occurrence. The condenser consists of a tub filled with water, into the upper part

of which the pipe from the boiler conveys the steam, where it branches out into a number of descending pipes, which unite at the bottom again into one pipe, and this conveys the condensed water to the interior boiler. Various modifications of constructing the condensing apparatus principally applicable to the descent of the pipes within the tub, are described : such as constructing them with two or more branches descending vertically, or in tortuous direction.

The boiler is to be supplied with water from the condensing tub after it has abstracted the latent heat of the steam, and thereby become heated, by which a saving of fuel will be effected. For this purpose the tub is furnished with two pipes, having stop cocks to regulate their use, the one for the admission of cold water and the other for the passage of the water to the boiler, when it becomes heated in the condensing vessel.

The other purposes to which this apparatus, or parts thereof may be applied, are distillations of spirits from worts, or the separation of the more volatile from the more aqueous portions of compound liquids ; and to render it suitable to such purposes, the interior boiler is dipensed with, and a rectifying apparatus is added.

It appears pretty evident from this, as well as from the other parts of the invention, that the patentee has neither informed himself by means of periodical works on science and the arts, nor been informed by his official agents in the matter, of what has already been effected in the way of distillation.

Fire Arms.—To William Bingham, of St. Mary Hall, Esq., and William Dupe, Gunmaker, both of Oxford, a patent "for certain improvements on fire arms of different descriptions," was granted on the 24th of September, 1831, and the specification was deposited in the Enrolment Office on the 24th of March, 1332.

The introduction of percussion powder instead of flint and steel for igniting gun-powder in fire arms, has given rise to a very great variety of modifications in the construction of gun locks, and amongst others to the one before us, in which it is proposed to make the barrel terminate in an acute conical cavity within the breech, and from the apex of this hollow cone proceeds the touch-hole to the priming nipple. The hammer, which is operated upon at once by a straight main spring, strikes the nipple within the stock, so that there appears nothing on the exterior but the handle by which the cocking is effected. The seear and

the trigger are likewise much simplified, being but one piece. The whole arrangement is simple and ingenious, and appears well suited to the purpose for which it is designed, though there are many parts of the lock approach very closely to other patent contrivances having the same object in view.

These patentees propose in addition to the foregoing, a very material alteration, and we are inclined to think considerable improvement in the manufacture of the stocks of muskets and other fire arms. They propose to make the whole, or at all events the principal parts of the stock of sheet iron, by which they contend that the cost of manufacture will be diminished, while the stocks will be rendered more useful, particularly when applied to military purposes; and much more durable, as they will, according to the specification, last almost for ever. A piece of sheet iron is first cut out of the form of an isosceles triangle, whose central length is about twice its breadth at the base; this then is bent into the required form by means of a saddle-backed anvil, or block, and suitable tools. It is then to be cleaned and painted, or japanned inside, to prevent it from rusting; then to be securely fixed to the fore part of the stock, which may be either made of iron or of wood, in the usual manner, according to the purposes for which it is intended, the preference is, however, given to iron. The butt end and the top are to be inclosed by soldering in plates made to fit the opening, but if the stock be intended for a soldier's musket, the end plate is made to open to admit a soldier's provisions, or ammunition, and thus the utility of the musket will be augmented. The exterior of these iron stocks is to be bronzed of the usual colour of gun stocks, or of any other to suit the taste of the manufacturer or his customers.

TANNING.—To William Drake, of Bedminster, near Bristol, Tanner, a patent " for an improvement in tanning hides and skins," was granted on the 7th October, 1831, and the specification was deposited in the Enrolment Office on the 7th April, 1832.

The principal novelty in this patent consists in applying the tanning liquor on one side only of the skin, and causing it to ooze through the skin to the other side; from whence the aqueous portion of the liquor is chiefly abstracted by evaporation. The result of this process is said to be, that the skins are more thoroughly and uniformly tanned, and the operation is completed with *cold* liquor in ten *days*, instead of ten *months*. If this statement

should prove to be true, and we see no good reason to doubt it, the patent is one of great value and importance.

The specification informs us that the skins or hides to be tanned are to undergo the usual primary process of *liming ;* they are then to be immersed and well *handled* in a vessel containing *backward* (which is a weak solution of tan) until thoroughly saturated, which removes the lime and prepares them for a stronger impregnation. Thus prepared the skins, excepting such as are intended for *butts* and *middlings*, which are shaped accordingly, are to be rounded (i. e. their irregular edges taken off); then two of them are to be laid together face to face, and be carefully sewn together with waxed thread at their edges, so as to form a kind of bag impervious at the junction, leaving a small opening at the shoulder for the insertion of the neck or spout of a funnel-shaped vessel; but, it is observed, it would be preferable to sew between the skins a collar adapted to receive the end of the funnel. As bags so formed would bulge out when filled, they are to be confined between two gridiron-like frames of parallel bars adapted to compress the bag in such a manner as to produce internally a vertical stratum obliquid of about an inch between the two skins; and as the skins are thickest towards their middles this variation is compensated for, by cutting away a portion of the vertical wooden bars from a straight into a hollow curved line. The skins are suspended by loops to the bags, which traverse the upper horizontal bars of the frames, and the two frames are duely drawn together by four screw bolts passing through the extremities of the top and bottom bars. The funnel being inserted into the aperture between the skins, it is charged with strong tan liquor sufficient to distend the bag and leave a surplus quantity to supply the loss by evaporation after the moisture has penetrated to the outside of the bags ; a small gutter at the bottom of and between the frames receive whatever liquid may drop from the skins, and conduct it into a vessel, by which it is returned whenever necessary into the funnel reservoir above. To prevent the compression of the vertical bars from forming permanent indentations and ridges in the skins, the patentee directs that the bags be occasionally shifted a little laterally.

To facilitate the evaporation, and consequently the absorption of fresh solutions of tan, the operations are recommended to be conducted in chambers artificially warmed, and the liquor which oozes through the skins, and is received into the gutters is directed to be conducted into vessels acting the part of refrigeratories, in

order that *cold* liquor may always be supplied to the skins; but how this liquor is to be preserved cold in a warm chamber, the specification omits to inform us.

When the skins are sufficiently tanned, which is well known by various indications to practitioners in the line, (chiefly, by their increased thickness, hardness, and russet colour), a stitch or two of the sewing at the bottom of the bag is opened, and the liquor is received and carried off by the gutter underneath.

The claim to invention does not consist in the mere application of liquor inside of a bag formed of skins, but to the general combinations, and especially to the mode of accelerating the penetration of the tanning liquor by exposing the outer sides of the skins to evaporation.

Although we have a very favorable opinion of this process, and that great economy will result from its adoption, there appears to be one defect in it. The skins being laid vertically, the pressure of the column of liquid will cause a much more rapid absorption of the tan in the lower than in the upper part of the skins; and if no injury is produced to the lower by continuing the process until the upper is fully saturated with tan, there is at least a loss of time. It is also probable that the liquor is stronger at bottom than at top of the bag. From both these causes therefore we should not expect that the leather produced would be very uniform in its quality. To obviate these defects, we would submit to the patentee, as a preferable arrangement (and one which will not affect his patent-right) to suspend his frames midway upon axes of rotation, and to fix at each end of his bag a charging vessel with a stop cock, or some other simple contrivance to answer the same object. The bags may then be reversed at pleasure, or placed in any desired position, and the lateral shifting required between the bars will take place of itself. If there were only one charging vessel with a stop to it, it would suffice, as by turning the frame round half way, it may become the discharging aperture.

LOCOMOTION.—To Sir James C. Anderson, of Butterant Castle, in the county of Cork, Bart., a patent "for certain improvements in machinery for propelling vessels on water, which improvements are applicable to other purposes," was granted on the 2nd of August, 1831, and the specification was enrolled in the Enrolment Office on the 2nd of February, 1832.

The "improved machinery for propelling vessels on water," con-

sists in a peculiarly formed paddle wheel, and in a variety of mechanism by which the motive force employed is given; the "application to other purposes" consists in the employment of the same mechanism to the propulsion of mills or carriages on land. Being unable now to enter upon the latter applications, we shall in our present paper on this patent confine ourselves to the description of the paddle wheel, in the construction of which the patentee has exhibited an intimate knowledge of the subject, and a considerable degree of ingenuity in the arrangements, by which he obviates the leading defects of previous inventors.

The paddle wheel is a new modification of the mechanism first proposed, we believe, by Mr. Robertson Buchanan, for the propelling of steam vessels, in which two eccentric circles revolving in parallel planes, are united to each other at their peripheries, producing thereby a parallelism in the floats or paddles. By this modification the patentee considers that he obviates the objections that have been made to Mr. Buchanan's plan, besides obtaining the important advantage to such sailing vessels as have these paddles fitted to them, of enabling their crews to raise the floats with great facility out of the water, in order that they may not impede the sailing during favorable winds: and when the floats are so raised above the level of the water, they all take positions parallel with the horizon, so that in heavy seas the waves are received upon the edges of the floats.

At fig. 1, Pl. VII. is a side elevation of the improved paddle, and at fig. 2, is added an edge view or elevation of the same; the letters in both figures, which are similar, having reference to corresponding parts.—*a* is the main revolving axis made fast to the centre *b* of the *guide* wheel *c c c*; *d d d d d* are the floats, of an angular form in their horizontal section, strongly attached at their upper extremities, by joints to the guide wheel at *e e e e e*, and at their lower ends by similar joints *f f f f f* to the propelling wheel *g g g*, whose axis *h* turns in the plummer blocks *i i*. By this arrangement it is evident, that when rotation is given to the guide wheel (by any suitable power), the same motion is communicated by the floats to the propelling wheel, and that the floats mnst always act in lines parallel to each other;—the distance between the centres being the uniform length of the floats, the required depth of the floats is thus easily regulated. The floats are made very narrow, as shown by the proportions in the drawing; they are of an angular figure, as before noticed, presenting a wedge-formed surface to the water in the direction of

the course of the vessel, with the view of lessening the impediment arising from the angular motion of the floats, and by giving them such a velocity of rotation, as will cause them during the times of immersion and emersion, to move through a horizontal space, equal to the space moved through by the vessel propelled, that no appreciable loss of power is sustained. The floats are joined to the wheels at their opposite corners in a diagonal direction, and they are strengthened by bars fixed across them horizontally on their hollow sides as seen at fig. 2; *k k* is a double railway formed of two semicircular wrought iron bars, which are to be strongly fastened by any convenient means to the side of the vessel, or to an abutment projecting from the vessel. The plummer block *i* is supported upon the railway to which it is made fast by a pin *l*, when the paddle wheel is in use; and when it is required to take the paddles out of the water, the propelling wheel is drawn upwards upon the railway by the following means. The lower part of the plummer-block *i* has two cheeks so as to embrace the two sides of the railway as best seen in fig 2; at *m m* there are transverse bolts which connect the opposite cheeks of the plummer-block, and which receive the end links of two chains *n o;* these chains respectively pass between the two bars of the railway, and round the barrels *p q*, which are fixed on the axis of the toothed wheels *r s;* the latter are geered into two pinions *t u*, having on their axes the winches or cranks *v v* and *w w*. If force be applied to the winches *v v*, the pinion *t* will actuate the wheel *r*, and wind the chain *n* on to the barrel *p;* the chain dragging the plummer block *i*, and the propelling wheel with it, up the railway, as shown by dots at *x x x*, which is not quite its highest elevation. The use of two crane apparatuses (which should be provided with ratched wheels and palls) as already referred to, is for steadying and controlling the action of each other, and for fixing the propelling wheel at any point on the railway, on either side of it; though not shown in the drawing, it is obvious that the railway may be lengthened and the geer be more elevated to raise the wheel to any required height, and that when the axis of the propelling wheel is brought to a level with the axis of the guide wheel, all the paddles will take a horizontal position, and offer but little obstruction to the passage of the water between them, as beforementioned.

The claims to invention in the foregoing apparatus consists, separately, in the form of the paddles, and in the manner shown in the drawing of connecting them to the wheels, and to the rail-

way, and apparatus for changing the position of paddle wheels according to circumstances. I also claim the whole apparatus in its combined state as described.

EVAPORATING SYRUPS.—To Andrew Ure, of Finsbury-square, in the Parish of St. Luke's, in the county of Middlesex, Doctor in Medicine, a patent "for an improved apparatus for evaporating syrups and saccharine juices," was granted on the 22d Sept. 1831, and the specification was deposited in the Rolls Chapel Office, on the 22d March, 1832.

The nature of the above invention for evaporating syrups and saccharine juices is an apparatus consisting of a double pan, with an intermediate space for containing a solution of chloride of calcium, or acetate of soda; the fire being applied to the bottom or other exterior surface of the outer pan, while the syrup is contained in the interior pan. The saline solution between the two pans is maintained steadily at a proper degree of dilution or liquidity, and consequently of boiling temperature, by means of certain subsidiary contrivances. At fig. 3, Pl. VII. is represented a vertical section of the apparatus, and at fig. 4 is a plan of the same. Fig. 5, is an elevation of the thermostatic mechanism. Fig. 6, the rake for clearing out the viscid syrup. The same letters of reference indicate corresponding parts of the apparatus, in the several figures where they occur. A, A, A. indicates the exterior vessel or bath pan, made of iron or other suitable metal, for containing the saline solution. This pan may be round, oval, rectangular, or of any other shape at the pleasure of the operator; its bottom may be somewhat arched, as a plane surface is apt to warp by alternations of temperature. B, B, B, represent a pipe terminated at top with a light safety valve, to give vent to the steam thrown off by the saline solution during ebullition. This pipe is bent into a zig-zag, or serpentine form, where it passes through the water in the cistern C, C, to favor the condensation of that steam, and the heating of that water. The water resulting from the condensed steam flows back into the pan through the small tube D, and is distributed through apertures in its extremity E, along the under surface of the saline solution. The cistern C, is furnished at top with a float and rod to indicate the depth of water in it; F, represents another tube which issues immediately from the bottom of the cistern at G, and which is intended to supply water to the saline bath through the stopcock, or valve H, and

thence through the perforated tube of distribution E, near the bottom of the pan, whereby the water dissipated by evaporation is restored, and the equilibrium of dilution is maintained. The action of that stopcock, or valve of supply, is regulated by a former invention of the patentee, called a thermostat, which is described in the 69th page of our last volume. The manner in which that invention may be conveniently applied in the present case is particularly shewn in fig. 5, where *a*, *a*, are two pairs of compound thermostatic bars acting in concert, the undermost bar of which is fastened firmly by the middle *b*, to a bracket bolted to the side of the iron pan, and the uppermost bar is connected at *c*, to an upright rod *d*, which, passing through the stuffing-box *e*, moves up and down by the motion in flexure of the said thermostatic bars correspondent with the increase and diminution of the temperature of the bath. By the operation of this mechanism, aided by the adjustment of the screw-nut *f*, which modifies the length of the rising rod *d*, the lever or rack of the stopcock, or valve H, is moved so as to admit water whenever the saline bath, by concentration, exceeds in its boiling temperature the desired degree of heat. I, indicates the place of a mercurial thermometer, the bulb of which descends into the saline bath. It serves as a check on the thermostat, and a guide towards its accurate adjustment. The mechanism at K consists of a stone, or other block L, attached by the rod M, to the one end of the balance-lever N, to serve as a counterpoise to the damper-plate O, which is suspended to the other end of the lever. Should the liquid of the bath be thrown into too furious an ebullition, by undue violence of fire, the said block will be raised, and depress the damper-plate into the passage of the chimney. The index P is calculated to shew the depth of liquid in the bath, and thus affords evidence of its keeping the proper level. At O is seen a stopcock, through which the saline solution may occasionally be run off into the cistern R, and whereby the bath liquid may be reduced to any desired level within the pan. In this way also the heating medium may be readily withdrawn from contact with the sugar pan S, without extinguishing the fire. The pump T serves for returning the saline solution into the bath pan, through the pipe U. The sugar pan S, may have any desired shape, and its bottom may be either curvilinear or plane with the requisite declivity towards the pipe of discharge for the syrup, shewn here at V. The valve is fitted into the inner end of the discharge pipe, so that no syrup is allowed to lodge in the pipe during the opera-

tion of boiling. The valve is opened and shut by a screw, (as shewn in the plan) or other convenient mechanism. The bottom surface of the sugar pan may be smooth or plane, but the form preferred by the patentee is represented in section at W, fig. 1, where the metallic lamina (sheet copper for example,) is corrugated, so as to bring nearly a double surface of metal within the same area, or under the same body of syrup. In the figure, for instance, a sugar pan, seven feet long, is supposed to have its bottom formed of sheet copper fourteen feet long, shortened by corrugation, or crimping, into a length of seven feet. These corrugations may be either straight or curvilinear, the principle of their formation being to amplify and stiffen the metallic lamina that constitutes the lower portion of the sugar pan, and to afford channels for the ready escape of the steam of the saline bath, which, when acting on a flat bottom is apt to cause concussions during ebullition, and to obstruct more or less the intimate contact of the heating bath with the metal of the sugar pan. The most efficacious heat of the chloride of calcium solution bath for evaporating syrups, is stated to be 280 degrees of Fahrenheits' scale, though other temperatures, both above and below that point, may with safety be applied. Y, Y, shews the line of screw bolts by which the flange of the copper, or interior pan, may be secured to the flange of the iron, or exterior pan, the former flange being turned outwards in the figure, and the latter flange inwards. The final discharge of the syrup along the channels may be accelerated by the use of the rake represented in fig. 4, the knobs, or fingers of which, are formed to suit the corrugations, and are covered with a cloth glove. The relative positions of the thermostatic mechanism, and of the several pipes represented in the accompanying figures, may be varied without inconvenience to the process of sugar boiling.

The patentee's claim to invention consists in the combinations of apparatus described for evaporating syrups and saccharine juices, by the heat of a saline bath, composed of a strong solution of chloride of calcium, or acetate of soda, which boils at a temperature considerably above the boiling point of water, and the application of one or other of the said saline solution baths to sugar pans, with corrugated bottoms, or corrugated bottoms and sides.

We have the satisfaction of acquainting our Readers that this new apparatus has been already most successfully applied in evaporating syrups in a sugar-house in the Commercial-road,

London; and that the results have been the production of a larger quantity of refined sugar from a given quantity of muscovado, than has hitherto been obtained by other modes of operating. The apparatus for regulating the temperature being self-acting, and the facility afforded of instantly withdrawing the heating medium, are points of great importance in the economy and management of a sugar-house, which will be duly appreciated by every enlightened refiner.

SPINNING.—To John Jellicorse, of Stansfeld Mill, in the county of York, a patent for "certain improvements in spinning machinery," was granted on the 28th January, 1832, and the specification was deposited in the Enrolment Office 28th March, 1832.

The improvements in spinning machinery proposed by this patentee apply to the flyer and bobbin, and the parts immediately connected with them in a mule spinning machine. The spindle which carries the bobbin, runs on a tapering point on the lower supporting rail as usual, and is preserved in its place by a steadying top rail, through which it passes. Immediately under this rail is fixed, upon the spindle, the pulley, by which its motion is communicated. The motion it is stated will by this arrangement, be rendered much steadier than usual, and the arms of the flyer may consequently be made sufficiently strong to prevent them from being expanded by the centrifugal force arising from the rapidity of their revolution.

The different parts of this invention are shown by fig. 5, Pl. VIII. where *a a* represents a portion of the frame of a spinning mule, *b b* the drawing rollers, from which the thread *c* passes directly into the top of the spindle at *e*, and after passing the steady frame *f* and the pully *g*, it is brought out at the small hole *h*, and next conveyed spirally round the flyer arm *i*, and finally to the bobbin *k*. *l* is the supporting rail, in which the conical points of the spindles turn, and *m* is the coping rail, which is to be actuated by machinery of the usual construction. The coping rail is covered with a piece of leather *n*, and a piece of woollen cloth *o o* is glued on the lower end of the bobbin to cause the friction necessary to adjust the twisting and taking up the actions.

The spindle is somewhat smaller immediately below than it is where it passes through the upper rail, that when it is elevated it may be made to clear the coping rail, and its lower end may be turned outwards to the position represented by the

dotted line *p.p*, which enables the spinner to remove the full bobbin, and replace it by an empty one.

TIDE MILL.—To Oliver F. George, of Great Cumberland Street, in the county of Middlesex, Esq., a patent "for certain improvements in machinery for acquiring power in tides or currents," was granted on the 28th September, 1831, and the specification was enrolled on the 28th March 1832.

This invention, which is stated to have been communicated to the patentee by a foreigner residing abroad, consists of an endless chain, carrying a number of paddles or float boards. This float board chain passes about two drums, placed horizontally at a distance from each other, proportionate to the number of float boards which the drum is intended to carry. To prevent the chain from slipping upon the drums, they are made with projecting studs, which take into open spaces made in the chain for their reception. A series of hinges, corresponding with the number of paddles to be employed, are fixed upon the chain: and to these hinges are fixed the float boards, which are prevented from turning backwards when the pressure of the water comes upon them by a fixed stop. From this stop proceeds a short bar, in the form of an arc of a circle to form a guide to the float board as it folds forwards in leaving and entering the water, which it is thus made to do without causing any obstruction to the motion of such float boards as are fully immersed. Each of the float boards are also provided with a short chain extending, angularly, from their exteriors to the chain before them, as additional checks to prevent them from being forced by the water, from the perpendicular position, or moved at all without carrying with them the chains, and consequently communicating motion to the drums; and through them any machinery with which they may be connected for the purpose of being put in motion.

The whole machinery is fixed to a strong framing, supported on a floating barge or other vessel, or supported on an erection made for the purpose, according to the situation for which it is intended, for the invention may be used either as a tide mill, or as a mill to be actuated by a running stream.

WRITING.—To J. Smith and Wm. Dolier, of Liverpool, Gentlemen, a patent "for a durable copy book, or writing tablet, and improved delible ink to be used therewith," was granted on the 14th of October, 1831, and the specification was enrolled in the Enrolment Office, Chancery Lane, on the 9th of April, 1832.

These articles are, in some respects, like the wares of Peter Pindar's razor merchant; they are made "to sell," and they are about as *original*. The "durable copy book" is, in fact, no book at all; and the "delible ink" we ourselves, and us, as well as every other draftsman in England, have used a thousand times over, even as our forefathers did, who were before us; and if we search into the records of antiquity, we shall find that divers renowned authors have kindly handed down to posterity the composition of said delible ink in indelible characters, lest it should be effaced from the memories of succeeding generations; and must we now add to the labours of our predecessors, by telling the reader that this patent composition is a mixture of water, gum Arabic, and lamp-black? —or, instead of said lamp-black, a pigment of any other desired colour similarly combined? Our readers are, perhaps, incredulous, and imagine that if there is nothing new in the materials, there may be something original in the manner of putting them together. In this supposition they are indeed right enough, for it is the "ould original" method adopted by our great grandmamma in making plum-puddings for Adam, at which time, we guess, spoons were not in fashion. Messrs. Smith and Dolier gravely tell us to take a gallon of hot water (not hot enough to scald fingers we recollect, though we do not remember the precise thermometric temperature mentioned), then take from said gallon one pint of said hot water, add thereto 1lb. of gum Arabic, and 4 oz. of lamp-black; mix these with your *hands*, rub incessantly, never mind the labour and the filth, for pestles and mortars are not mentioned in the specification, and consequently will not answer the purpose.

> Make the mixture "thick and slab,
> "That the charm be firm and good."

Then add by degrees the remaining 7 pints of water, mixing well all the time; this done—"bottle and cork for use." We have the authority of Laurence Sterne for believing, that this delible ink is not of human origin, and that it was the identical composition used by the recording angel when she wrote down the oath uttered by Corporal Trim; for we cannot for a moment suppose that muriatic acid, or the chloride of lime, can enter into the composition of angels' tears. Whether the said angel's account-book was formed of the same materials as Messrs. Smith and Dolier's copy-book, we will leave our readers to determine after we have described it, as angels and mechanics seem to make a somewhat incongruous mixture.

Take a piece of linen cloth, stretch it upon a frame; take of "single size" 14lb., whiting 1lb., linseed oil ¼lb.; mix these at a temperature of from 90° to 100° Fahrenheit. With this composition prime your cloth well, and when dry, pumice down the lumps and

knots, and smooth with a stone. You may repeat this operation of priming, pumicing, and smoothening down, thrice. The work is now ready for colouring. The colour is Paris-white, mixed with linseed oil, to the consistence of a thick paste, which is to be laid on the tablet with a trowel, and the process repeated as often as may be deemed necessary—drying, smoothening, and polishing, of course, between each layer. The finish consists in flattening or dead-colouring the surface with turpentine.

If our readers will turn to our second volume of this series, page 186, they will find the substance of the foregoing patent as respects the tablets; they will also meet with some valuable information connected with the subject, in our third vol., first series, page 172.

Steam Engine.—To William Lloyd Wharton, of Dryburn, in the county of Durham, Esq., a patent "for certain improvements in engines for raising or forcing water by the pressure and condensation of steam," was granted on the 30th of January, and the specification was deposited in the Enrolment Office on the 30th of March, 1832.

Steam engines, on the principle introduced by Mr. Savary, are those intended to be improved by Mr. Wharton's invention; but instead of allowing the steam to come into contact with the surface of the water, he introduces on the surface of the water, in the cylinder, a large hollow float, of an exterior diameter very nearly equal to that of the interior of the water and steam cylinder. Over the water in the cylinder is introduced a quantity of oil, which passes up the sides of the float, and prevents the steam from ever coming into contact with the water to be acted upon. After the steam has been admitted from the boiler into the cylinder, and forced down the float, and consequently the water underneath, it is conveyed to a conical condensing vessel considerably elevated above the cylinder, where it is condensed by means of a jet of water admitted from another vessel situated immediately above the condenser. And thus a vacuum is obtained in the upper part of the cylinder, which allows the atmospherical pressure on the surface of the water to send up a quantity sufficient to elevate the float to the top of the cylinder, when the steam is again admitted to force down the float, and through that medium to force the water, now occupying the cylinder, to ascend a delivery pipe to the required elevation. The supply pipe is provided with a valve, opening upwards, to prevent the return of the water into the well, or reservoir, from which it has been raised; and the delivery pipe is also provided with a valve opening upwards, to prevent the return of the water into the cylinder when the vacuum is created.

A tumbler hammer is introduced for the purpose of opening the communication between the steam boiler and the cylinder, and closing the communication between the cylinder and condenser when the float reaches the top of the cylinder, and of reversing the stop-cocks or valves of these communications when the float reaches the bottom of the cylinder, thus rendering the engine self-acting as far as regards the opening and closing of the steam communications.

SPINNING.—To James Long, of Greenock, Scotland, North Britain, Flax Dresser, a patent "for certain improvements in machinery for spreading, drawing, roving, or spinning flax, hemp, or other fibrous substances, dressed or undressed," was granted on the 24th of September, 1831, and the specification was deposited in the Enrolment Office on the 24th of March, 1832.

To modify the common spinning machinery, so as to render it applicable to the spinning of strong, coarse, hempen yarn for cables and other ropes, is the object of this invention. Mr. Long proposes, in the first place, to make the machine larger and stronger. The hemp is first to be distributed on the endless leather of the spreading table, by which it is conveyed to the feeding rollers, and by them delivered upon the gill, or needles, by the operation of which the fibres are drawn out and laid lengthways into a band of hemp of uniform width and thickness. The gill consists of a series of arms projecting from an endless band, passing about two rollers, with indentations so arranged, that the ends of the arms next the chain fall successively into them, and cause the points or needles projecting from other ends of the arms, to penetrate into the hemp, and to draw it out from the feeding rollers: and when the needles have drawn the hemp, and carried it the length of the gill, they are withdrawn by their passing over the second notched roller, while the hemp is delivered to the pressing roller. The difference between this and the common flax gill consists in an adjustment, by which the distance between the feeding rollers and the gill, as well as the extent of the drawing operation of the gill, can be regulated to correspond with the length of fibres to be operated upon. Another improvement is the introduction at pleasure of an additional pair of drawing rollers, with an adjustable gearing to give them motion, when the length of the fibre requires such an addition.

The other parts of the process of spinning cords for rope-makers do not differ materially from the usual operation of spinning flax, except the introduction of a series of folds of strong felt, through which the strand is drawn after it passes the conical condensing tube. The intention of the felt is to press down and cause to be mixed into the strand the ends of the fibres, which would otherwise stick out, and give a roughness to the cord when spun.

TRANSACTIONS OF THE SOCIETY OF ARTS, &c.

THE Society of Arts having published the *second part* in completion of their 48th volume, we purpose noticing the whole contents of the latter, with references for the details of the various subjects either to the previous volumes of this work, which contained many of the subjects inserted in the *first part*, or to the original compilation published by the Society, for those articles which we omit the insertion of.

IMPROVING LAND LYING WASTE.

To J. PEART, Esq. of Settle, in Yorkshire, the *gold Ceres medal* was voted, for a very detailed communication respecting the method employed by him of bringing into cultivation about 70 acres of waste land, forming part of Bentham Moor, a tract of 3000 acres of similar quality. The sagacity of Mr. Peart enabled him to discover, beneath the intractable boggy clay which formed the surface, an abundant deposit of marl: by the liberal use of this substance, combined with deep draining, and at the same time taking advantage of the accidental lowness of agricultural wages, he has succeeded after five years labour, in reducing to a system of regular tillage and pasture, land that before had lain in a state of utter and hopeless neglect. *The clear cost of the undertaking, including the purchase of the land, appears not to have exceeded £10 per acre.*

SWING FRAME FOR CHEESES.

The *large silver medal* was presented to WILLIAM BLURTON, Esq. of Field Hall, near Uttoxeter, Staffordshire, for his swing frame for turning cheeses, a model of which has been placed in the Society's Repository.

New cheese requires to be hardened considerably by gradual drying before it becomes fit for market. For this purpose the cheeses are spread in a single layer on the floor of the cheese-room, and are turned by hand every day, in order to expose each surface alternately to the air. This, on a large dairy farm, is a slow and laborious operation, which, as it devolves on the female servants, sometimes prevents them in the hurry of business, from paying proper attention to keeping every implement used in the dairy in that degree of order and absolute cleanliness so essential to the good quality of the produce. Another objection to the common method is, that the floor on which the new cheeses are laid soon becomes penetrated with moisture, so that the benefit which each surface of a cheese in succession gains by exposure to air, is in part lost by being placed the next day in contact with the damp floor.

Mr. Blurton's inventions consists of a dozen strong shelves framed together, and having bars nailed from top to bottom of one side, in order to prevent the cheeses from falling out while

in the act of turning. The frame is suspended on two strong pivots, one of which is let into the wall of the room, and the other is supported by a strong post. Two catches keep the frame upright, and prevent it from being turned more than half round. By first filling the shelf immediately below the axis of the frame, and then placing the cheeses alternately on the two nearest shelves above and below that which has been already filled, the preponderance of one side over the other can never be more than the weight of one cheese; the whole power, therefore, required to turn the machine cannot, in any circumstances, be greater than this and the friction of the pivots. The cheeses, in the act of turning, drop on those shelves which, in the former position of the frame, were above them, and, having been exposed to a current of air for twenty-four hours previous, have become perfectly dry.

Mr. Blurton has had the machine in use for five or six years, and finds that, by means of it, fifty-five cheeses are turned in the same time which is required for turning two by hand. Three other advantages attend its use: First, that a room thus furnished will hold thrice as many cheeses as when they are laid on the floor. Secondly, that the shade afforded by the shelves, together with the current of air which passes between them, has the effect, in hot weather, of preventing excessive sweating, and consequently loss both in weight and quality, as well as diminishing the necessity of rubbing the cheeses. Thirdly, the ripening of the cheeses is hastened, so that on an average they are ready for market five weeks earlier than usual.

GROWTH OF TIMBER.

The *thanks* of the Society were voted to Mr. J. Goss, of Okehampton, for his specimens illustrative of the effects produced, by lopping trees, on the growth of timber.

It is well known to vegetable physiologists of the present day, that timber, or the trunk of a tree, is composed of concentric layers, or rather cylinders, of wood, each cylinder being the produce of one year. It is likewise generally agreed, that the fibrous part of these cylinders is an aggregate of the fibres (or roots, as they may without much impropriety be called), which originate from the base of each leaf-bud, and descend to the ground, insinuating themselves between the inner bark, and the outer sap-wood covering the surface of this latter. In many species of wood, each annual cylinder is evidently composed of an interior porous or tubular part, hooped in by an outer part of more compact texture, because containing fewer and smaller tubes. It is evident, therefore, and was long ago observed by M. Duhamel, that any natural circumstances which remarkably increase or diminish the number of leaf-buds in a tree, will occasion a corresponding modification in the thickness of the layer of wood produced by them. Artificial circumstances, such as lopping in

autumn or early spring, diminish the number of leaf-buds, and would be expected to be followed by the deposition of a thinner layer of wood than usual. The investigation of the effect produced by lopping, is the object of Mr. Goss's communications. See Trans. p. 214.

METHOD OF FREEING FRUIT TREES FROM MOSS AND INSECTS.

Mr. J. Thomas, of Devandon Green, near Chepstow, received the *thanks* of the Society for a communication of the above-mentioned process to them. He stated that he had occupied his present cottage premises for forty years, and has paid particular attention to the fruit trees growing on them. The soil is poor and sandy, and the trees are very liable to be infested and overgrown with grey lichen, two or three inches long. A few years ago many of the trees which he had himself planted, had become stunted in their growth, being covered with lichen, and the young shoots having become knobby and carious, and infested with insects. His first attempt to restore the vigour of his trees was by scraping off the moss and lichen; but this, besides being tedious in practice, proved to be inefficacious; as in two or three years the trees were as much encumbered as before. In 1829 he dusted his trees with quick lime, which he found on the whole to be very advantageous; and in the next year 1830, he mixed soot with the lime. The consequence of this application was, that the moss and the lichen were entirely removed, the bark assumed a green healthy colour, the insects disappeared, and vigorous new shoots put forth from the old branches.

The mixture is best made by taking five bushels of well burnt lime, fresh from the kiln, and slaking it with hot water in which salt has peen dissolved. When the lime has fallen to a fine dry powder, add, by small quantities at a time, a bushel of soot, stirring it until the two ingredients are completely incorporated. Advantage is to be taken of the first foggy day when the trees are damp but not dripping, to dust them over with this composition; one man may treat fifty trees in a day, and the operation in Mr. Thomas's opinion should be repeated twice in a year, the first time in March, and the second time in October or November. Mr. Thomas has likewise found that the turf beneath his trees, which used to be full of moss, has now become a fine sward, quite free from moss, no doubt in consequence of those particles of the composition which fell to the ground during the dusting of the trees.—Trans. see vol. xlviii. p. 216.

LENGTH OF THE ROOTS OF PLANTS OF WHEAT.

The *thanks* of the Society were presented to the Earl of Macclesfield for a letter accompanied by a specimen, showing the great depth (from five to six feet) to which the roots of wheat have been found to penetrate, and therefore proving how much

this valuable grain may be affected by the subsoil of the land on which it is grown.—See Trans. vol. xlviii. p. 218.

FRUIT GATHERER.

The *sum of five pounds* was presented to Mr. C. BUSH for his fruit gatherer, consisting of a small net bag, attached to the end of a long light pole, and having a jointed mouth-piece, by means of which a drawing motion is given to two blades that meet at an acute angle, and thus cut through the stem of the fruit, which then falls into the bag.

The best fruit is generally to be found at the top of the tree, where it is most exposed to the fresh air and light; but such fruit, especially if at the end of long slender sprays, is not easily gathered by the hand; and if beaten or shaken down is commonly injured by the fall. For gathering such select fruit, instruments of various kinds have been invented, and some have already been published by the Society. It is perhaps not easy to contrive an instrument which shall fulfil all the required conditions, but Mr. Bush's contrivance has some points of novelty about it, and is therefore submitted to the notice of the public.

A sketch of this apparatus is given in our Pl. VIII. fig. 1, where *h* represents an open net hanging from a jointed steel frame, of which the piece *a a* is welded to the toothed quadrant *d*. This quadrant is inserted in a notch in the brass ferrule which terminates the brass pole *f f*, and moves on the centre pin *e*. At *g* a spring catch is inserted, which dropping into the interval between any two adjacent teeth of the quadrant, allows as many angular variations in the position of the jointed frame as there are teeth in the quadrant. *b c*·*b c* are two flat blades, the interior edge of each of which is ground sharp; they move on the centre pin *c*, like the upper half of a pair of scissors: *b a b a* are two bent pieces jointed at *b b* to the cutting blades, and at *a a* with the piece so called in the foregoing part of the description. A spring is placed under the piece *a a*, which bearing on the short ends of *b a* (those, namely, which project beyond *a* towards *e*), tend to separate the ends *b b* from each other, and consequently to keep open the cutting edges *b c*.

In order to use this instrument, first, let the most convenient angular position be given to the jointed frame by means of the toothed quadrant and spring catch, then raise the pole so that the fruit shall hang within the net, its stalk being between the blades. On drawing down the pole very gently, the blades will take a firm gripe of the stalk, which if the fruit is ripe parts from the spray, and the fruit falls into the net.—Trans. vol. xlviii. p. 211.

REMOVING IMPRESSIONS OF ENGRAVINGS.

The *large silver medal* was voted to Mr. FELIX FEUILLET, of Paris, for his method of removing the impressions of wood blocks and metal plates, from the paper on which they were ori-

ginally printed to other paper. Valuable prints, the paper of which has become stained, mildewed, or otherwise injured, will probably be found capable of being restored by means of this process; nor does there seem any reason to apprehend that, with a few modifications, it may not be applicable to engravings of considerable size, although the inventor appears hitherto to have practised only on vignettes, and prints of small size, for illustrating books. In this application of it he has succeeded in an extraordinary degree, as the specimens left by him in the Society's possession demonstrate. The process is fully described at p. 27, vol. xlviii. of the Society's Transactions, by M. Feuillet, in the French language, to which an abstract, in English, is appended.

IMPROVED VIOLONCELLO.

The *large silver medal* was presented to Mr. S. A. Forster, of Frith Street, Soho, for an improved tail-piece for violincello.

The tail-piece of a violincello is a thin board usually of ebony, fixed at the end of the instrument opposite to the pegs, and to which the ends of the strings are tied, or otherwise fastened. Mr. Forster's invention consists first, in making three longitudinal cuts in the tail-piece, dividing it into four bars, united only at the lower end, sufficiently separated at the other to prevent their touching while in a state of vibration, as represented at fig. 2, Pl. VIII., and attaching the strings one to each of the bars. In each bar are three holes, and the string is to be fastened to whichever of them on trial shall be found to give the most perfect tone. Secondly, the material of the tail-piece instead of being wood as usual, is of soft hammered brass; this alloy being found to give freer vibrations than copper, and to be preferable to iron or steel, on account of the metallic quality of tone which attends the use of these substances. By the above arrangement, each string being attached to its own bar, the string and bar form a continuous and distinct line, and therefore the vibrations of the different notes interfere less with each other. When the strings are tied to one common tail-piece, the breaking of one puts all the others out of tune; but in Mr. Forster's invention as each string has its own bar or tail-piece, the breaking of one affects the others in a very slight degree.—Trans. vol. xlviii. p. 231.

IMPROVED HANDLES FOR GRAVERS.

The *sum of five pounds* was presented to Mr. J. Donaldson for his handles for gravers, and etching points. When we consider the combination of strength with dexterity that is required in cutting lines on copper-plate, and the necessity on the part of the artist of feeling, as it were, at the end of his graver, that both the touch and the sight may mutually assist and correct each other, it will be evident that the form of the handle and the manner of connecting it with the cutter, are by no means circumstances of trivial moment. Mr. Donaldson has contrived in a

very simple manner to unite the cutter and handle together, yet capable of being separated in an instant, in order to protract or withdraw the cutter, and thus to lengthen or shorten the entire instrument, as the nature of the work on which the artist is employed may require.—Trans. vol. xlviii. p. 227.

GEOLOGICAL MODEL OF THE COAL FIELD OF SOUTH WALES.

For which Mr. TAYLOR received the Society's *gold Isis medal*, is described at p. 252 of our last volume.

THERMOMETER FOR CORROSIVE LIQUIDS.

The *silver Isis medal* was voted to the late Mr. Robert Jowett*, of John Street, Fitzroy Square, for his thermometer for ascertaining the temperature of acids, and other corrosive liquids. It is composed of two glass tubes, one placed within the other, and blown at one end into a bulb, the cavity of which opens only into the bore of the outer tube, while it is welded all round externally to the bottom of the inner tube, so as to prevent the entrance of any liquid in the space between the two. The degrees are marked on a slip of paper fixed in this intermediate space, and are thus very easy to read off. It is far more commodious in use than the thermometer with a turn-up scale; and from its cylindrical form, it may very easily be fitted to the stuffing box of a boiler, in order to indicate the heat of the steam.—Trans. p. 220, vol. xlviii.

IRISH MARBLE.

The *thanks* of the Society were voted to J. DOMBRAIN, Esq., of Dublin, for a small block of white marble raised from a quarry belonging to that gentleman, in the county of Donegal. To the finer purposes of the statuary it seems not to be applicable, on account of the coarseness of its grain, when compared with the marble of Carrara; but for flags for halls, and other similar uses, it seems to be very well adapted. Mr. Hogan, a statuary, lately returned from his studies in Italy, states that this marble has the very rare quality of being entirely free from metallic substances. Trans. vol. xlviii. p. 223.

PORTABLE EASEL.

The *silver Isis medal* was voted to Mr. A. R. BURT, of Chester, for his portable easel.—See p. 31 in our last volume.

CALICO PRINTING.

The *thanks* of the Society were voted to Mr. F. DAVIS, of Cold Bath Square, for a paper containing the results of experiments on the action of the oxide of uranium as a mordant in calico printing.—Trans. vol. xlviii. p. 47.

* Prematurely carried off in the exercise of his profession, in the medical department of the Polish armies.

OIL FOR CHRONOMETERS.

The *gold Isis medal* was presented to Mr. H. WILKINSON, of Pall Mall, for an improved method of preparing oil for lubricating delicate machinery.—See our last volume p. 123.

MACHINE FOR PIERCING PRINTED SHEETS.

The sum of *five pounds* was voted to Mr. PHILIP WATT, Fore Street, Lambeth, for an instrument for piercing sheets for book-binders. In preparing printed sheets for being stitched, they are first folded, then laid one on another, and pierced at the binder margin with three holes by means of an awl, through which the thread is afterwards drawn by a needle. The number of sheets that can be pierced at once depends of course in a great measure upon the strength of the person employed in this work, which generally falling to the lot of women, is found to be a very laborious business. Mr. Watt's machine was invented to save the greater part of the personal labour, and to perform the work with more expedition. As many sheets as would make a thick pamphlet are by this means pierced at once, by a very moderate exertion of power; but as machines very similar to Mr. Watt's have been long in use, it does not possess sufficient novelty to merit a more detailed notice in our work.—Trans. vol. xlviii. p. 237.

IMPROVED SLIDE REST.

The *silver Isis medal* was voted to Mr. PARSSONS, of Great Guildford Street, for his improved slide rest for a turning lathe. This consists in placing the tool in a perforated cap, capable of turning round in the circular base on which it stands, and thus allowing the tool to be set at such a degree of angular obliquity as may best suit the work that is in hand; it may likewise be set to work considerably beyond the length of the slide. It will be found very convenient in clearing the shoulders of castings from the sand which adheres to them, as well as in boring cylinders. At fig. 3, Pl. VIII. is given a perspective sketch, and at fig. 4 is a section of the same:—*c* is the holder, having a circular flanch at bottom, as shewn in section by fig. 4; *a a* is a ring or collar, hollowed out in the under part to admit the flanch of the holder, and allow it free liberty of circular motion. The holder being laid on the slide *b*, the ring is dropped over it, and is screwed down to the slide as shewn in the perspective. The square hole in the holder through which the boring bar *d d* passes, is cut so low (as shewn in the section), that the boring bar, when passed through it, rests, not on the bottom of the hole, but on the upper surface of the ring, and therefore has a broader bearing than if it rested on the hole. The boring bar being brought to its proper position for the work, by turning the holder on its axis, is secured in its place by the strong screw *l*, which likewise prevents, at the same time, all motion in the holder.

The neck *c* if preferred may be left of its full width at top, and may have two screws to bind the tool the firmer.—Trans. vol. xlviii. p. 240.

SILK FROM SPIDERS.

The *silver Isis medal* of the Society of Arts, &c. was presented to Mr. D. B. Rolt, of 21, Friday Street, Cheapside, for silk from the garden spider (*arena diadema*), a specimen of which has been placed in the Society's Repository.

In the early part of the last century the attention of the Royal Academy of Sciences at Paris was called to a memoir of M. Bon, of Montpelier, on the silk which he obtained from the bags in which the common house spider deposits its eggs. These bags were carded, and spun into thread, and a few small articles, such as gloves and stockings, were made of it, rather as objects of curiosity than of use. The further investigation of the subject was committed by the Academy to M. Reaumar, who after many trials gave it as his opinion that this kind of silk could never be worth collecting on account of the small quantity yielded by each spider, its great inferiority in lustre to that of the silk worm, the impossibility of making the spiders live in quiet with each other, and the great difficulty of providing them with suitable food.

The subject of Mr. Rolt's experiments has been the garden spider (arena diadema); the webs of which in autumn are so conspicuous on the surface of the shrubs, and in other similar situations. On allowing one of the animals to crawl over his hand, he found that it drew a thread with it wherever it went; he likewise without any difficulty wound some of this thread over his hand, finding that the spider continued spinning while the thread was winding up. On this hint he connected a small reel with the steam engine of the factory in which he is occupied, and putting it in motion at the rate of 150 feet per minute, found that the spider would thus continue to afford an unbroken thread during from three to five minutes. The specimen of this silk which accompanied Mr. Rolt's communication was wound off from twenty-four spiders in about two hours. Mr. Rolt estimates its length at 18,000 feet; its colour is white, and its lustre is brilliant, and completely metallic, owing probably to its great opacity. No attempt has been made by him to combine two or more filaments into one by winding, nor of course to form it into thread by throwing.

The thread of the garden spider is so much finer than that of the silk-worm, that the united strength of five of the former is, according to Mr. Rolt, equal only to one of the latter, and assuming the weight is in proportion to the strength, and that a spider will yield twice a year a thread 750 feet long, which the produce by a single silk-worm is 1900 feet, it follows that the produce of one silk-worm is equal to that of 6.3 spiders. Now as on an average it takes about 3500 silk-worms to produce a pound of silk, it

would take about 22,000 spiders to produce an equal quantity. Besides, spiders are not so easily confined as silk-worms, and whenever two come into contact a battle ensues, which ends in the destruction of the weaker one. Spiders kept for silk must, therefore, be each in separate dens or cells, and the apparatus contrived by Mr. Rolt for this purpose, although very ingenious. and well adapted to carry on a course of experiments with a hundred or two, would manifestly be wholly inapplicable to any purpose of commercial utility; Mr. Rolt has, however, made some interesting additions to the history of the garden spider, and has obtained the silk in its natural state, exhibiting all its peculiar lustre. His method likewise of winding the silk directly from the animal is, to say the least of it, effectual and ingenious.—Trans. vol. xlviii. p. 234.

CLOCK ESCAPEMENTS.

The *large silver medal* and *twenty-five pounds* were voted to Mr. CHANCELLOR, of Dublin, for a clock escapement, of extraordinary simplicity, and great ease both of make and adjustment. (Trans. p. 69.) And to Mr. J. HARRISON, of Barton on Humber, the *large silver medal* and *ten pounds* were voted for an escapement, which in principle bears some resemblance to one of Mr. Cumming's escapements: though complex, and consequently expensive, it is, however, more easy of adjustment, than the spring escapements; and from the account of its performance applied to a church-clock, seems capable of great precision.—Ib. p. 54.

FLY FOR TURRET CLOCKS.

To the same ingenious artist, the *silver Isis medal* and *five pounds* were voted for his self-adjusting fly for turret-clocks. The use of the fly is to regulate the motion of the striking part, so that its momentum shall not exceed a certain rate. But the common apparatus occasions the first stroke on the bell, and sometimes the second also, to be feebler than the rest. Mr. Harrison's improvement avoids this inequality, and therefore renders the striking of the clock more distinct.—Ibid. p. 534.

SIGNAL ROCK STAFF.

The *large silver medal* was presented to Commander HOOD, R. N. for his staff for insuring the vertical ascent of signal rockets.—See our last volume, p. 175.

FIRE ESCAPE.

The *large silver medal* was presented to Mr. J. BRAIDWOOD, for his chain ladder, &c.—See *Register*, vol. vi. N. S. p. 85.

PACK SADDLE.

The *silver Isis medal* was presented to Mr. REILLY, of Finsbury Place, for a graduated pack saddle, the tree of which being

jointed in the ridge, allows it to be adjusted with much greater accuracy to the back of any particular animal than can be done in the ordinary saddle.—Trans. vol. xlviii. p. 92.

BORING INSTRUMENT.

The *large silver medal* was voted to Mr. Hilton (since deceased), of Regent Street, for a very beautiful conical hollow tool for boring the bung-holes of casks truly circular and of any dimensions.—See *Register*, vol. v. p. 192.

CARPENTER'S HOLDFAST.

The sum of *five pounds* was presented to Mr. DUNGEY, of New Compton Street, for an improved carpenter's holdfast, the peculiarity of which consists in an adjusting screw, so to regulate the pressure as to prevent the work held by it from being crooked or otherwise injured.—See our last volume, p. 30.

AMERICAN PATENT.

For machinery for cleaning Wool from burs and filth by means of steel combs, while the wool remains on the skin. LEWIS L. MILLER, *Rochester, Monroe county, New York, January* 31, 1831.

A cylinder, resembling the large cylinder of a carding machine, is to have on it a number of rows of steel teeth about five-eighths of an inch in length; to this cylinder a revolving motion is to be given. A second cylinder, about a foot in diameter, is placed parallel with the former, and slides to and from it on a carriage. The skin to be cleaned is to be put upon this smaller cylinder, and fixed to it at one edge by a moveable strip. The feeding, or smaller cylinder, may be turned by means of a crank, the hand graduating it as may be necessary. The mode of using it will be obvious from the foregoing description.

" What the inventor relies on in this improvement, is in applying the combs in this way to cleaning sheep's wool from burs, cockles, and other filth common to wool, making the same article more valuable in market, at less than one-fourth the common expense in cleaning."

FRENCH LAW IN HIGH PRESSURE ENGINES.

Continued from page 20.

Second Set of Instructions in relation to the execution of the Royal Ordinance of October 29th, 1823, concerning High Pressure Engines.

The royal ordinance of the 29th October, 1823, requires that no boiler shall be sold, much less used, until it has been provided with two safety valves, and two disks of fusible metal, and also has been proved by the hydraulic press, and marked after the proof.

Those makers of high pressure boilers who may have boilers to be proved, will inform the Prefect of the same, who will transmit the information to the engineer of mines, residing in the department, or else to the government civil engineer, who is to supply his place. (Art. 7 of the Ordinance.)

The Prefect will take care that these operations, relating to the proof, are conducted with as little delay as possible, that no inconvenience may result from them to the arts. The engineer will ascertain, first, if the safety valves are of the proper dimensions. He will ascertain also, if the apertures to be covered by the fusible plates are of the proper sizes; that is, if one has a diameter at least equal to that of one of the safety valves, and the other at least twice this diameter. He will further satisfy himself that the position of these plates is such that they will fulfil their object.

The boiler will not be proved until after the fusible plates are applied. The fastening of the plates to the boiler will be preceded by the operations now to be described. The engineer must determine from the table hereunto annexed, the degree of the thermometer at which the metallic plate to be used, must fuse. He will next ascertain whether the metal proposed to be employed has the requisite fusibility; this may be verified in two ways.

1st. If the metal has been prepared by the maker of the boiler, the engineer will proceed to determine the temperature at which each of the ingots to be employed will fuse, using the apparatus employed by the maker for the purpose, if he is satisfied of its accuracy.

2nd. If the metal is that used in commerce, the engineer will merely satisfy himself that it bears the legal stamp designating its fusibility, which has been affixed, by the engineer of mines intrusted with making such trials, in the manufactory of the metal: this stamp will be of the kind spoken of in the next paragraph.

The engineer, having ascertained that the alloys, of which the plates are to be made, fuse, at 18° F. and 36° F., respectively, above the temperature of the steam of ordinary working pressure, will have the two disks cast in his presence, and will place upon each an octagonal stamp with the motto, "Civil Engineers of Mines;" and in the middle of this stamp he will have, immediately, engraved the degree of fusibility of the disks. The disks will then be fixed upon the boiler.

If the maker of the boiler shall have procured disks already tried and stamped, the engineer will have no other trouble than to ex-

amine the stamps, indicating their fusing points, before having them affixed to the boiler.*

The engineer should attend to the fact that he is not in search of the precise temperature at which the plates fuse, but of that at which the plate becomes so soft as to yield to pressure. This distinction is important, because the plates of fusible metal lose their tenacity before they melt. The stamp should therefore denote, not the temperature of perfect fusion, but that which softens the metal so much that it will give way to a pressure corresponding to this temperature.†

The boiler tubes having been attached to the boiler, as well as the fusible plates and the safety valves, (duly loaded,) the boiler must be filled with water, and proved by means of a forcing pump, or of a hydraulic press, to be furnished by the manufacturer, who shall also provide the labour necessary to its use.

The proof pressure must be five times that at which the engine, to which the boiler belongs, is to be worked; for example, if the boiler is to contain steam of two atmospheres, the proof pressure must be carried to ten atmospheres.

When the boiler may have resisted such a pressure, the engineer shall have it marked, in his presence, with the number showing in atmospheres the pressure under which the boiler is to be worked.

The apparatus for marking shall consist, first, of a circular plate of copper, struck at the mint of Paris, bearing an inscription, *Ordinance of October 29th*, 1823; upon this the number of atmospheres and half atmospheres, shall be marked; 2nd, of three screws, of the same metal, intended to fasten the plate to the boiler. After the screws have been inserted and tightened, the engineer shall have the head of each cut off even with the plate, so as to erase the groove on the head. He shall then have a fleur de lys stamped upon each head by a die larger than the head itself.

The plate and screws shall be furnished by the manufacturer.‡

By means of the method just described, all high pressure boilers will be proved where they are manufactured, which will confine the proving to a few departments.

If there is no manufactory of boilers in a department, the duties of the engineer, in relation to boilers, introduced into the department, either for the use of high pressure engines already licensed, or which may hereafter be licensed, will be limited to ascertaining that they have the two proper marks. This can easily be done by means of the models.

* Manufacturers will find fusible metal, prepared according to the directions of M. Gay Lussac, Member of the Royal Academy of Sciences, at the store of M. Collardeau, &c.

† In this paragraph, the great advantage of the fusible plate over the safety valve, viz. that it yields by the effect of temperature, and not of pressure, seems to have been lost sight of; to have followed such a direction to the letter, would have been to reduce the efficacy of the plate most materially, by depriving it of the power of guarding against the explosions resulting from a defective supply of water within the boiler.—Trans.

‡ Manufacturers may procure them, at cost, at the Royal Medalic Mint, &c.

One of these models is deposited in the Archives of the Prefecture, the other in the office of the Engineer of Mines, or in that of the Government Civil Engineer.

(Signed,) BECQUEY, *Counsellor of State*, &c.

Approved.

(Signed,) CORBIERE, *Minister of the Interior*.

Paris, May 7th, 1825.

MISCELLANEOUS.

PATRONAGE OF LITERATURE.—The Russian Chamberlain, P. N. Demidov, has assigned during his lifetime, and for twenty-five years after his death, the annual sum of 20,000 roubles, to be distributed in prizes of 5000 roubles each, to the authors of the most distingished works in Russian Literature, which may have appeared in the course of the year, and another sum of 5000 roubles yearly to assist in the printing of approved MSS.; the Academy of St. Petersburgh to make selection of the works. Among those works excluded from competition, are poems, novels, tales, dramatic writings, &c. "on account of the facility of finding publishers for such writings, and the sale which they generally have being sufficient to reward their authors, even to a greater extent than the amount of the prizes."

IVORY SURFACE GLOBES.—An admirable globe of this description has just been produced, for facilitating the teaching of astronomy and geography by delineation with the pencil. A handsome sphere, set in a neat frame, which is so contrived as to allow the poles to be elevated and depressed at pleasure, and with the great lines, &c. marked upon its polished surface, is presented to youthful students for the exercise of their skill and ingenuity in tracing upon it either celestial or terrestrial figures. We can hardly imagine a more pleasing occupation, or one so likely to make a lasting impression on the memory.

THE LARGEST DIAMOND IN THE WORLD was found in the river Abaite, about ninety-two leagues to N. W. of Serro do Frio. The history of its discovery is romantic.—Three Brazilians, An. de Sousa, Jose Felix Gomes, and Th. de Sousa, were sentenced for some supposed misdemeanour to perpetual banishment in the wildest part of the interior. Their sentence was a cruel one, but the region of their exile was the richest in the world.—Every river rolled over a bed of gold, every valley contained inexhaustible mines of diamonds. A suspicion of this kind enabled these unfortunate men to support the horrors of their fate,—they were constantly sustained by the golden hope of discovering some rich mine that would produce a reversion of their hard sentence. Thus they wandered about nearly six years in quest of mines, and Fortune was at last propitious to them. An excessive drought had laid dry the river Abaite, and here, while working for gold, they

discovered a diamond of nearly an ounce in weight. Overwhelmed with joy at this providential discovery, they resolved to proceed at all hazards to Villa Rica, and trust to the mercy of the Crown. The Governor, on beholding the magnitude and lustre of the gem, could scarcely credit the evidence of his senses. He immediately appointed a commission of the officers of the diamond district to report on its nature, and, on their pronouncing it a real diamond, it was immediately dispatched to Lisbon. It is needless to add, that the sentence of these three condemnados was immediately reversed. This celebrated diamond has been estimated by Rome de l'Isle at the enormous sum of 300,000,000*l.* sterling! It is uncut, but the late King of Portugal, who had a passion for precious stones, had a hole bored through it, in order to wear it suspended round his neck on gala days. No sovereign possessed so fine a collection of diamonds as this Prince —*Monthly Magazine.*

MAGNETIC OBSERVATORY.—At the weekly meeting of the Academy of Sciences, on Monday, Baron de Humboldt communicated the important information that through his means a magnetic observatory had been founded in the island of Cuba, which, together with that of M. Arago at Paris, that of M. de Humboldt at Berlin, and that which the learned baron has established at Pekin, under the direction of M. Fuss, extends the means of making diurnal magnetic observations over 198 degrees of longitude, with the additional advantages that all these observatories are furnished with similar instruments by the same maker.—*Ibid.*

COPPER IN MEAT.—At the same meeting M. Chevreul made very long report on the soups fabricated by the Dutch Company at Paris, and which was highly favourable to this useful establishment, proving that their soups were superior to those of the Military Hospital of the Val de Grace. This report, from the very curious experiments and important details it contained, on the nature of the different culinary processes by which bouillon is procured, was unanimously ordered to be printed. Among the interesting and curious facts was one which M. Chevreul had obtained most unexpectedly—namely, that a very appreciable quantity of copper exists in a quantity of soup equal to an English quart, the produce of a pound of meat. To satisfy himself that this was not the result of error, or arising from the vessel in which the analysis was made, M. Chevreul repeated the experiment in vessels of tin, iron, platinum, porcelain, and glass, and copper was constantly found to exist in beaf, veal, partridge, the white and yellow of eggs.—The quantity of meat operated upon was always half a kilogramme, equal to a pound of English, which was placed in a quart of water; the time of ebullition was five hours. The common practice of putting the meat into cold water, and raising this to ebullition, was proved, by experiment, to be very superior to that of plunging cold meat into boiling water.—*Ibid.*

List of New Patents omitted in our last Number.

LACE.—To J. Freeman, of Tewkesbury, lace-manufacturer, for improvements in machinery for ornamenting and producing devices upon lace-net.—Specification to be enrolled in six months.—Dated February, 22, 1832.

PLANING.—To A. B. Shankland, of Liverpool Street, London, for a new method of cutting, working, and planing of wood, minerals, and metals, by means of machinery. Communicated to him by a foreigner.—Feb. 23.—Six months.

LACE.—To W. Crofts, of Linton, in the county of Nottingham, frame-smith, for improvements in machinery for making lace or net, commonly called bobbin net lace.—Feb. 23.—Six months.

LAMPS.—To R. Watson, of York Place, Portman Square, Esq. for an improved lamp.—Communicated to him by a foreigner.—February 23.—Six months.

CARDS.—To T. de la Rue, of Crown Street, Finsbury Square, card-maker, for improvements in manufacturing and ornamenting playing cards. Feb. 23.—Six months.

NAILS.—To W. Church, of Bordesley Green, near Birmingham, gentleman, for improvements in machinery for making nails.—Feb. 25.—Six months.

WOOLLEN CLOTHS.—S. Walker, of Millshaw, near Leeds, clothier, for improvements in gig machines for dressing woollen cloths.—March 1.—Six months.

NAILS.—To J. Joyce, of Portland Road, St. Marylebone, gentleman, for improvements in machinery for making nails of iron, copper, and other metals. Communicated by a foreigner.—March 1.—Six months.

VALVES.—To O. Beard, of Coggeshall, Essex, ironmonger, for an improvement in the construction of cocks or taps for drawing off liquids.—March 1.—Two months.

WOOLLEN CLOTHS.—To G. Oldland, of Hillsley, Gloucestershire, cloth-worker, for improvements in machinery for shearing, dressing, and finishing of woollen cloths, and other fabrics.—March 3.—Six months.

MINING.—To T. Petherick, of Penpelleck. Tydwardreoth, Cornwall, mine-agent, and J. F. Kingston, of Islington, Devon. gentleman, for improvements in machinery for separating copper, lead, and other ores, from earthy and other substances, with which they are or may be mixed; the said improvement being applicable to the machinery for which a patent was granted by his late Majesty, to T. Petherick, dated April 28, 1830.—March 8.—Six months.

WOOLLEN CLOTHS.—To W. Wells, of Manchester, machine-maker, for a new and improved mode of constructing gig machines, otherwise called raising machines, &c.—March 8.—Two months.

MINERAL WATERS.—To F. C. Bakewell, of Hampstead, gentleman, for improvements in machinery for manufacturing soda water, &c.—March 8.—Six months.

CARRIAGES.—Fo J. Gibbs, of the Kent Road, engineer, and W. Chaplin. of the Adelphi, coach maker, for improvements in wheeled carriages, and in the means of constructing the same.—March 8.—Six months.

KNITTING.—To H. Warner, of Loughborough, hosier, C. Hood, of the same place, frame-smith and setter-up, and B. Abbot, also of the same place, frame-work knitter, for improvements upon machinery now in use for manufacturing stockings, warp web, warp-net, &c.—March 8.—Six months.

VALVES.—To John Day, of Birmingham, brass-founder, for an improvement in the manufacture of cocks for the stopping and drawing-off gas and water, and for other purposes for which cocks are now used.—March 15. Six months.

PAPER.—To H. Brewer, of Surrey Place, Old Kent Road, Southwark, wire-weaver, for improvements in machinery for making paper.—March 15. Six months.

FUR.—To J. Walmsley, of Manchester, silk-winder, for a machine for

a machine for cutting off the fur or hair from beaver and other skins.—March 15.—Six months.

PAPER.—To M. Towgood, of Dartford, paper-maker, for improvements in cutting paper.—March 15.—Six months.

PRINTING.—To W. Day, of Gate Street, Lincoln's Inn Fields, lithographic printer, for improvements in the construction of printing presses.—March 22.—Six months.

PROPELLING.—To B. Woodcroft, of Manchester, printer, for improvements in the construction and adaptation of a revolving spiral paddle for propelling boats and other vessels on water.—March 22.—Six months.

DYEING.—To W. A. Brown, of Liverpool, merchant, and H. Hendricks, of Passy, near Paris, now residing in London, for improved methods of manufacturing the prussiates of potash, soda, and iron, and the apparatus employed therein, and in certain new applications of the said prussiates as a substitute for indigo in dyeing various colours.—March 22.—Six months.

PAINTING.—To B. Cook, of Birmingham, brass-founder, for an improvement in the application of a material hitherto unused in the manufacturr of paints, varnishes, and for various other purposes.—March 22.—Six months.

MANGEL-WURZEL.—To P. Young, of Fenchurch Street, London, rope and sail-maker, for a new mode of manufacturing mangle-wurzel, for the purpose of producing certain known articles of commerce. Communicated by a foreigner.—March 22.—Six months.

LIST OF NEW PATENTS SEALED.

GAITERS.—To T. Gaunt, of Chapman Street, Islington, gentleman, for an improvement in gaiters, or spatter-dashes.—Dated March 27, 1832.—Specification to be enrolled in six months.

STEAM ENGINES.—To J. T. Beale, of Church Street, Whitechapel, engineer, for improvements in steam engines.—March 28.—Six months.

PRESERVATIVE.—To J. H. Kyan, of South Row, Euston Square, Esq. for a new mode of preserving certain vegetable substances from decay. March 31.—Six months.

MEDALS.—To J. Bate, of the Poultry, optician, for an improvement on machinery applicable to the imitation of medals, sculpture, and other works of art executed in relief.—April 9.—Six months.

SPINNING.—To A. B. Shankland, of Liverpool Street, London, for a new method of spinning flax and hemp by means of machinery. Communicated to him by a foreigner.—April 13.—Six months.

OIL.—To J. Demeur, of Water Lane, Tower Street, London, gentleman, for a manufacture in the extraction of oleaginous matter from a certain foreign vegetable kernel, and the application of the said oleaginous matter to the making of oil, candles, soap, &c. Partly communicated by a foreigner. April 13.—Twelve months.

BRICKS.—To J. J. Clark, of Market Raven, gentleman, J. Nash, of the same place, tile and brick manufacturer, and John Longbottom, of Leeds, machine maker, for improvements in the machinery used in the manufacture of tiles, bricks, bread, &c.—April 13.—Six months.

STEAM ENGINES.—To R. Roberts, of Manchester, civil engineer, for improvements in steam engines, and also in the mechanism through which the elastic force of steam is made to give impulse to, and regulate the speed of, locomotive carriages.—April 13.—Six months.

LITERATURE.—To G. Edmonds, of St. Mary's Square, Birmingham, gentleman, for a philosophic alphabet, or arrangement of letters, forms, or figures, by which the articulate sounds of languages may be scientifically denoted.—April 13.—Six months.

METALS.—To B. Cook, of Birmingham, brass-founder, for an improved method of manufacturing various useful articles from a metal not hitherto used for that purpose.—April 13.—Six months.

PATENTS ENROLLED BETWEEN 10TH APRIL, AND 10TH MAY, 1832.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

STEAM ENGINE.—To George Holworthy Palmer, of Manchester Street, Gray's Inn Road, Civil Engineer, a patent "for certain improvements in the steam engine, boiler, and apparatus, or machinery connected therewith, applicable to propelling vessels, carriages, and other purposes," was granted on the 16th of September, 1831, and the specification was enrolled in the Enrolment Office on the 16th of March, 1832.

Mr. Palmer states, that the object he has in view by the improvements made in the steam engine, is to render it less costly, more portable and effective, as well as more economical in its expenditure of fuel than those engines now in use, whether required for the propulsion of locomotive carriages and steam vessels, or for giving motion to any other description of machinery. Before referring to the drawings and descriptive reference of the same, he details the abstract parts of the engine and boiler which he claims as being novel either in principle, or as regards their peculiar modification.

First. The self-regulating blast apparatus, by which the quantity of fuel to be ignited in a given time is governed, in order to insure the generation of a volume of steam, suited precisely to all the variable speeds and powers of the engine.

Secondly. The steam calorific self-adjusting apparatus, which acts in conjunction with the blast regulator, and is so contrived as to lift the weight from the lever of the safety valve, and permit the steam to escape from the boiler should the aforesaid apparatus fail of instantly checking its evolution. The safety valve is however only an auxiliary or secondary mode of insuring security to the boiler under circumstances which are not likely to occur.

Thirdly. The self-acting safety apparatus by which the security of the boiler is insured, should the apparatus for supplying it with water fail in its effect, so that in the event of the water in the boiler being reduced below a determined level, the process of combustion will be instantly suspended, and the boiler protected from injury.

Fourthly. Making the products of combustion evolved from the furnace escape into the atmosphere below the level of the furnace bars, which will most effectually prevent the admission of atmospheric air into the furnace, excepting that portion which the blast and calorific regulating apparatus permits the blowers to project upon the fuel undergoing combustion. This mode shuts off the entrance

of atmospheric air as effectually as if cocks or valves were resorted to. For the moment the blower is thrown out of action, the fuel in the furnace, however intense its inflammation, is instantly damped in consequence of the ignited fuel being enveloped in an atmosphere of gaseous inflammable matter which as effectually extinguishes inflammation as carbonic acid gas, or other non-inflammable, when oxygen, or the supporter of combustion, is not combined therewith. This is not individually claimed as new, but as a necessary arrangement in conjunction with blast and calorific regulators, which together with the mode of raising the safety valve from its seat, the patentee requests to be distinctly understood as claiming; not only as applied to a steam engine, but also to every other description of boiler or vessel used for the purpose of evaporation or heating in the arts and manufactures. Whenever a regulated intensity of heat is required, let the purpose or object be what it may, or where a determinable temperature is required to be communicated, as in the purification of sugar, the distillation of spirits, &c. &c. through the medium of oils, fusible metals, and the like, instead of impinging the heat directly against the vessel containing the material intended to be so heated, it will be necessary in this case to generate the elastic fluid which gives motion to the small piston of the regulating apparatus in a copper, or other close vessel, about five inches diameter, as shewn in the drawings.

Fifthly. The pipes leading from the opposite ends of the horizontal part of the boiler, connecting with the lowermost part standing at right angles thereto, act as stays to steady the whole; but the ostensible object of their introduction is, to convey the water most remote from the direct action of the furnace by its own gravity, to replace that portion which may be carried to the upper part of the boiler by the great volume of steam generated between the two concentric cylinders, the interior one (the furnace); but for this, or a similar contrivance, would presently be destroyed by the intense action of the heat impinging thereon, inasmuch as the water in its attempt to descend perpendicularly into the space from whence it is constantly being projected would be steam logged, and consequently prevented from absorbing the caloric so rapidly as it is taken up by the metal. On no consideration whatever must other than distilled water or spirits be used in this boiler, for the deposition of earthy matter would lead to a rapid destruction of the boiler, and increase the consumption of fuel; and that in proportion as the capacity of the metal to transmit caloric through its pores, and from thence to the water in the boiler, is impeded by reason of the slow-conducting powers of the earthy incrustations thus deposited upon the heating medium.

Sixthly. To ensure a length of stroke in high pressure engines, (that is, only limited by the maximum length the cylinder can be cast and bored), and that without increasing the diameter of the piston rods beyond that which is required to withstand the alternate tug and thrust without resorting to the very objectionable short stroke and piston rod of so large a diameter, and without which it would be incapable of withstanding the thrust without being crippled and rendered useless. It is the modification and disposition of the various parts of the engine that is claimed under this head, and not any one part abstractedly considered.

Seventhly. The slide valve or valves, where more than one are used, with their various modifications, requiring neither casings nor stuffing boxes, the patentee claims as perfectly novel the action of these being seen, admit of mathematical adjustment by an effective mechanical arrangement (not claimed), and which enables the engineer instantly to reverse or stop the engine at pleasure.

Eighthly. For a modification of the crank and beam intended to supersede the use of a beam of the usual weight and dimensions, parallel motion, cross heads, and costly fittings and bearings connected therewith. This mode of converting the reciprocating into the rotative motion, accomplishes the grand desideratum of making one cylinder produce a more regular and equalized motion than can be accomplished by two cylinders when used to give motion to locomotive engines or paddle wheels.

Ninthly. The condensation by which highly elastic steam of any temperature may be converted into water, without the application of injections, or by the extension of surface by making the cubic contents of the condensing chamber equal to the number of cubic inches of steam discharged, each stroke of the engine when expanded into or below atmospheric steam (disregarding the additional effect obtained by a diminution of temperature). The cubic contents of the condensing chamber being arranged to condense steam of a previously determined maximum density, will affect the condensation of steam of any intermediate elasticity between the said maximum and steam of one atmosphere lower than this little or no advantage will be obtained, and at atmospheric steam this mode is altogether inapplicable.

To insure this mode of condensation, it becomes a sine qua non, that no steam be permitted to pass between the piston and its cylinder, or through the apertures in the valves that alternately shut off the communication between the cylinder and the condensing chamber, otherwise the condensation will partially cease, and that in proportion to the quantity of steam permitted to pass into the condensing

chamber. It is also of great importance that the water be drawn from the condensing chamber as fast as it is formed or precipitated therein, and conveyed to the boiler by a small force pump, or any other effective means, not only to prevent the cubic contents of the condensing chamber being diminished, but also to ensure a proper supply of distilled water to the boiler. The said condensing vessel to consist of one or more chambers, which may be made of light copper, or other material. The sphere is preferred as combining strength with great capacity. The patentee accomplishes the conversion of highly elastic steam into the liquid state exclusively by expansion, without regard to cooling surface. He claims also the making the condensing chamber of flexible material, as varnished canvas, silk, cotton, or other suitable air and steam tight material, so as to allow of its alternate inflation and collapsing every stroke of the engine, and to avoid rupture (should the steam ever arrive at an elasticity exceeding the atmospheric pressure), it must be enclosed in a wove wire casing, which will effect the object, and permit the atmospheric air entering and escaping with great facility, without checking the inflation, or collapsing of the aforesaid condensing chamber. The more this condensing chamber exceeds the proportions given, the more effectual will be its operation, as the steam will expand with less resistance than in a vessel of less capacity, as it more resembles the process of turning highly elastic steam into the atmosphere.

Lastly. He claims not only all the aforesaid parts that are new either in principle or modification of previously known mechanism, but also the general arrangement of the engine and boiler united as a whole, holding himself at liberty to combine these improvements under a variety of forms, in which the same objects are effected, the external character varying as circumstances may require. The figure and form of the engine as applied to locomotive carriages, or paddle wheels of steam vessels, will be explained by the drawing and descriptive reference accompanying this specification.

Fig. 1, Pl. IX. is an elevation of the machine, shewing the disposition of the various parts. Fig. 2 is a longitudinal section of the boiler and furnace, shewing the flues, steam, cylinder, &c. Fig. 3 is a transverse section of the boiler, furnace, and calorific regulator, shewing its connection with the blast regulator. Fig. 4 is a sectional plan of the lower part of the boiler, furnace, and flues. Fig. 5 is a longitudinal section of one of the slide valves with its seat. Fig. 6 is a plan of the seat, shewing the steam and condensing passages. Fig. 7 is a section of an evaporating vessel, in connection with a

metallic or other bath, shewing the application of the calorific regulating apparatus. The same letters of reference are used to denote the same parts in all the views. A is the boiler, in the lower part of which and concentric with it is placed the furnace B, secured to it by flanges, bolts, and nuts. The grate C is supported upon an iron frame D, and is retained in its place by a wedge, or other simple fastening, and by releasing which the grate may be withdrawn when required. The furnace is replenished with fuel through an aperture in the crown, by means of a pipe extending outside; the boiler terminates by two slides or doors, which are alternately opened when fuel is admitted; to prevent the discharge of the heated gases, a rake is added, working in a stuffing box to force the fuel into the furnace should the pipe get choked. It is the intention of the patentee, however, to adopt a self-acting mode of feeding the furnace with fuel by means of fluted rollers, or other equally efficient means, and which will receive their motion from the steam engine. E E E E are four flue pipes connected to the top of the furnace, and descending below the bottom of the ash pit, which prevents the natural flow of atmospheric air to supply the furnace.

The exit of the pipes being carried below the level of the furnace is not claimed as new, but is adopted in preference to cocks, or such like contrivances, in conjunction with the blast regulating apparatus. F F are two circulating tubes, by which the annular space round the furnace is more uniformly supplied with water. G a pipe with its valves, through which the supply of water to the boiler is injected to replace the quantity evaporated. H the injecting pump for supplying the boiler with water; I the blowing apparatus for injecting the requisite quantity of atmospheric air into the furnace. K, a pipe through which the atmospheric air is injected into the casing L, which surrounds the ash pit, between which a communication is formed by perforations in the lower part of the cylinder which constitutes the furnace; the blast is by this means rendered less partial in its action on the fuel. To one extremity of the pipe K is attached a regulating valve or cover M, which when closed prevents the exit of the air contained in the pipe—the quantity of air discharged through this aperture depends on the area of the opening given to the valve. It is opened or shut, or otherwise adjusted by means of a screw and handle, or may be operated on by any other convenient means. This valve is used for regulating the quantity of atmospheric air passed through the furnace suited to all the variations of resistance. To the other extremity of the pipe K is adapted a hinged valve or cover N, so weighted as to counterpoise the pressure of the air within; the pipe when closed compels the air discharged by the

blowing apparatus to pass into the casing L, and from thence into the furnace through the flue pipes E E, &c. into the atmosphere, excepting that quantity which may be discharged through the valve M. The use of this valve is to limit the temperature of the water, and consequently the pressure of the steam in the boiler, by permitting when open the discharge of a great portion of the atmospheric air otherwise required for combustion. To effect this object the valve N is connected by levers O P Q, with their necessary rods of communication to the calorific regulating apparatus R, which consists of a piston of sufficient area to overcome the resistance opposed to it working through a stuffing box in a cylindrical syphon tube, containing a quantity of mercury as a medium by which the steam passing from the boiler into the regulating chamber acts upon the aforesaid piston. S a safety valve, with its graduated lever and weight; a loop T is formed on the end of the lever, and embraces the screwed end of the regulator piston when the nut V comes in contact with the loop; the lever and safety valve are lifted effectually, preventing the occurrence of accidents should the safety valve remain closed beyond the limiting pressure. The action of the safety valve and lever is rendered simultaneous by two small connecting links. W X is a chamber attached to the crown of the pinnace, and connected by a tube Y, with a piston and cylinder of precisely the same description and construction as that used for the calorific regulator r, and may be placed in any convenient situation for operating on a safety slide cock or valve Z, which, when the water in the boiler has evaporated so low as to endanger its safety from a deficiency of supply from the force pump, is closed, and completely prevents the passage of atmospheric air into the furnace—thus combustion instantly ceases, the ignited flue being deprived of air. The motion communicated to the piston by the steam generated in the chamber X, operates on the lever 1 by the cam 2, the lever rising with the piston until the cam or detent passes the fin 3, when the slide Z is instantaneously released, and falls by its own gravity, completely closing the passage through the pipe K. The combustion being suspended, the temperature of the water, and consequently the pressure of the steam is instantly reduced, thus preventing the destruction of the boiler by the powerful action of the fuel when the heating surface is unprotected by the water. For facilitating the reference, the regulators R are arranged with a view to perspicuity, rather than mechanical exactness. It will be perceived that the safety slide Z with its appendages have been omitted in fig. 1, lest it should have been rendered too confused. The steam cylinder, piston, and stuffing boxes being of the usual construction, do not require a particular description, the

only peculiarity being the great length of the cylinder compared with its diameter, and the small diameter of the piston rod. The adjustment of the piston in the cylinder is effected by means of screws and nuts at the two extremities, where they are connected to the chains *s s* by the loops *r r*. The slide valves *a a* are connected together by two adjusting side rods *b b*, and have two apertures each with a connecting chamber *c*. The seats have each three apertures of equal area with those in the slide, so that the alternate operation of admitting steam to the cylinder and condensing it, is produced without the aid of a casing or cover over the slide. The movement producing the alternating motion of the slides is of the tappet kind, capable of the nicest adjustment by means of screws and nuts at each end of the tappet rods *d d*, which also connect them with the chains. *e* is a carriage for supporting the tappet lever *f*, and the guide rollers *g g*, against which the tappet rods rub, and by which they are prevented from deflecting out of the right line when brought into action. The side rods *b b* are united at *h*, the middle of their length by a carriage furnished with friction rollers, which is embraced by the forked ends of the tappet rods *f*, and by which the slides are moved. The pressure tending to lift the slides from their seats by the action of the steam in their passages is counterbalanced by an external pressure produced by two helical springs *k k*, at the back of each slide, and the friction is diminished by two grooved rollers *l l*, working on a guide parallel to the face of the slide. *m* is the condensing chamber into which the steam is admitted after it has performed its office in the cylinder, where it is permitted to expand freely. The slide valve seats communicate with the upper part by the pipes *n n*, which enter the chamber separately or united in one pipe. The water produced by the condensation of the steam is drawn from the chamber by the force pump H through the pipe and valves *o*, which chamber is furnished with an inverted safety valve *p* to prevent collapsing. The steam is completely excluded from the engine by closing the slide valve *q*. The chains *s s* are fixed to the pulleys *t t*, whose axes turn in bearings on the bracket *v v*, firmly secured to the transverse bearers of the frame work of the carriage. These pulleys should be more in circumference than double the length of the piston's stroke. The reciprocating motion of the pulley *t* and the engine produce the revolution or rotation of the crank shaft w, by means of a lever keyed on one end of the pulley axis, and the intervention of the connecting rod *y*, the crank shaft revolving in bearings attached to the frame of the carriage. The radius of the lever must exceed in a trifling degree that of the crank *w w*. *z* a toothed spur wheel working into a pinion of half its diameter on the axis of the carriage

wheels 5, so that the carriage performs a distance equal to twice the circumference of the wheels 5 for each double stroke of the engine. Any other proportions of the wheel and pinion may of course be adopted as the nature of the machine or the required speed of the carriage may render necessary. On the crank shaft w is a pulley 6 grooved, to receive a catgut band for the purpose of driving the machinery to work the blowing apparatus. These wheels 3 and pulley 6 have been represented by dotted lines to prevent confusion. The machinery for working the blowing apparatus consists of two pulleys 7 on an axis 8, supported on two brackets 9 fixed to the side frames of the carriage. One pulley to receive the motion from the crank shaft w, and the other to communicate the motion to the pulley 10. On the axis of the blowing fan a greater number of pulleys may be found convenient to vary the velocity of the blowing fan, according to circumstances. The pulley axis 8 is cranked to form a winch by which the blowing apparatus can be worked by manual labour, where the engine is at rest, and for which purpose a provision is made to disengage the pully from the crank shaft w, by sliding the brass bearings in the bracket heads in the direction of the crank shaft. The catgut band will then be slackened, and the pulley will revolve without it; when it is required to be connected with the engine, the reverse of this operation will be necessary, in either of which positions the axis will be retained by a set screw 11. The force pump is worked by means of an adjusting crank 12, keyed on one end of the axis of the pulley *t*, and communicating with the pump piston by a connecting rod and slings 13. The pump is secured to a portion of the bracket *v*, projecting below the carriage frame.

The application of the aforesaid engine, and machinery and boiler, to the purpose of propelling vessels, will be evident from the preceding description, by considering the wheels 5 as the paddle wheels of the vessel. As a stationery engine applied to various purposes in the arts and manufactures the same arrangement is used with the substitution of a fly wheel in the place of the wheels 5. The application of the calorific regulating apparatus to the purposes of heating or evaporating by means of a bath composed of a metallic fluid, or other heating medium, is shewn in fig. 7, where *A* is the evaporating vessel, *B* the heating medium, and *C* the vessel in which the steam is generated by the heat which the medium acquires from the furnace *D*, to act upon the regulator piston, and ultimately by the intervention of the pulleys *E E*, lever *F*, and chain or rod *G*, on the damper *H*, by which the quantity of atmospheric air admitted into the furnace for the combustion of the fuel is regulated. In some

cases a second damper between the furnace and the chimney shaft is an advantage, and may be operated on by the same pulleys simultaneously with the damper H, which admits the atmospheric air to the furnace.

PLANISHING TIN PLATES.—To Joseph Maybury, John Maybury, and Joseph Maybury the younger, of Belton, in the county of Stafford, Iron Masters, a patent "for certain improvements in polishing and manufacturing of ladles, spoons, and other articles for culinary, domestic, and other purposes, made of iron, and tinned," was granted on the 24th of January, 1832, and the specification was deposited in the Enrolment Office on the 24th of March, 1832.

The application of a pair of planishing rollers highly polished, and mounted in a manner similar to that usually adopted for flatting rollers, constitutes the principal part of the improvements contemplated by these patentees. The tin plates are polished by being passed through between the rollers previously to their being formed into ladles, spoons, or other articles of culinary use. In stamping the polished plates into the forms for which they are intended, dies of the usual form, but of much finer finish, so as not to injure the polish of the plates, are to be employed. The articles are then to be finished in the manner usually adopted in completing the manufacture of spoons, ladles, and other culinary utensils.

PROPELLING.—To W. Hale, of Colchester, Machinist, a patent "for improvements in machinery for propelling vessels, which machinery is also applicable for raising or forcing fluids," was granted on the 13th of October, 1831, and the specification was enrolled in the Enrolment Office on the 12th of April, 1832.

The improvements in propelling proposed by Mr. Hale, consists in driving water forcibly out at the stern of the vessel under the water line, by means of a rotatory apparatus somewhat similar to the rotatory blowing and winnowing machines.

In the 5th volume of the present series of the *Register of Arts*, p. 67, we have given a description of a patented invention of Mr. William Hale's for raising or forcing water for propelling vessels, and the present patent has been taken out for a modification of the same method, therefore we refer our readers to the former description to obtain a general idea of the plan.

In his second patent Mr. Hale makes the exterior casing of the paddle box to recede from the centre spirally, constituting a curve whose distance from the centre of motion at its outer extremity exceeds the distance at its inner extremity by the space or opening

made for the escape of the water from the box. The water is admitted into the box through openings near the centre, in the manner usually adopted for the supply of air to the blowing machines. The propeller, or vane, which puts the water in motion through medium of a steam engine, or other first mover, consists of a single lever receding spirally from the axis or centre of motion. The motion of the vane is in the direction to cause the water within the box to recede from the centre, and escape finally in a direction which is a tangent to the curve; or its motion is towards its back, or that part farthest from the centre. The patentee does not however confine himself to the spirally formed vane, but proposed several other modifications of the moving or propelling part of his invention. Such as placing a series of oblique paddles or propellers on arms extending from the centre of the apparatus, as in his former patent; and these he again proposes to vary according to circumstances in number, magnitude, and position.

This propelling apparatus is placed near the stem of the vessel, with the axis in a vertical position, and the opening at the circumference of the paddle box made to communicate with the water in which the vessel floats through an opening in the stern, while the openings near the centre of the box are made to communicate with the exterior water through the bottom of the vessel.

The application of the invention to raising or forcing water is effected by connecting the induction openings with the well or reservoir from which the water is to be raised, and a delivery pipe with the eduction opening, and thus the machine becomes a rotatory pump.

Salt.—To W. A. Jump, of Marston Chester, Machinist, a patent "for improvements in drawing or extracting salt from salt pans," was granted on the 14th of October, 1831, and the specification was lodged in the Enrolment Office on the 13th of April, 1832.

This patentee proposes to employ salt pans of a circular form, that he may employ rotatory rakes to clear from the bottom of the pans the salt as quickly as it is formed, by which the impure salt denominated pan crust will be avoided, and the bottom of the pans, being kept clear of this, will allow the heat to be more efficaciously conveyed to the brine, and an economy of fuel will be the result. Another means of saving fuel is effected in this invention by conveying the vapour raised from the salt pan to another quantity of brine, that the heat may be transferred from the vapour to this colder fluid.

In the centre of the pan is made a circular hole, through which

passes the axis of the rotary rakes: this axis is protected from the fire, if such should be employed to effect evaporation, by a brick flue, and it is protected from the brine in the pan by means of a short cylinder projecting above its surface. A series of three or more rakes is fixed upon an arm extending from the axis to the circumference of the pan. These rakes are placed one behind the other, in an oblique position, so as to make with the arm an angle of about 45 degrees. By this arrangement the first rake removes the salt from the centre of the pan to nearly the middle of the second, and the second carries the salt to nearly the middle of the third, which delivers it into recesses formed at the circumference of the pan for its reception.

The patentee does not confine his claims to three, or any number of rakes working on the same shaft, nor does he confine his improvements to salt pans, heated by furnaces, but states that they are equally applicable to pans heated in any way which shall be found most advantageous.

Bread.—To I. Cawderoy, of Britania Street, Hoxton, Middlesex, a patent "for improvements in machinery to be used in the process of manufacturing bread and biscuits," was granted on the 14th of October, 1831, and the specification was deposited in the Enrolment Office on the 14th of April, 1832.

This patentee has devoted his attention to every part of the process of bread manufacture; he commences the operation by causing the flour to pass through a sieve, by means of a cylindrical brush, in very minute quantities, and with much uniformity. From this sieve, the flour descends into a mixing vessel, with an inclined bottom. The liquid to be mixed with the flour, to constitute the sponge, is admitted from a reservoir through a pipe near the bottom of the mixing vessel, and the quantity admitted during the process is adjusted to the quantity of flour passed through the sieve, by means of a stop-cock. On the inclined bottom of this vessel, a series of vertical rods, constituting a kind of rake, is made by means of a crank, to move forwards and backwards on the inclined bottom, in a direction at right angles to the inclination; and the apparatus is so arranged, that the quantity of inclination may be varied at pleasure, to suit different qualities of the bread intended, or of the materials employed in its manufacture. The greater the inclination, of course the quicker will the mixture pass off from the rake into the second mixing vessel, placed a little lower than the first, to receive it. This vessel, which has its bottom horizontal, is likewise furnished with a traversing rake, to mix the ingredients still more intimately.

The sponge is afterwards returned into the mixing vessels, to have an additional supply of materials to complete the dough, the usual time being allowed for it to rise and fall, to prepare it for separation into loaves and the operation of baking. The dough is next transferred to a pressing vessel, through an aperture at the bottom of which it is forced, by means of a piston, into a long trough, where it is separated into loaves, by means of a frame furnished with projections of the size of the intended loaves. The frame descends till the dividing partitions cut half through the dough in the trough. The dough is then turned by means of the trough frame, in which it is held swinging on two pivots, and the dividing frame is brought down again to complete the separation of the loaves.

The loaves are then conveyed into an oven on a stage mounted on rollers, and furnished with an endless band of cloth, or other suitable material, by the motion of which they are delivered in succession from the stage upon the oven floor; and when the baking is completed, this stage, with its endless band, is forced into the oven under the loaves, and brings them all out at one time. And thus will be obtained a much greater uniformity of baking than can be effected by the usual method of filling and emptying the oven.

GAS.—To G. Lowe, of Brick Lane, Old Street, Middlesex, Civil Engineer, a patent "for an improvement in, and connected with, the manufacture of gas for illumination," was granted on the 12th of October, 1831, and the specification was deposited in the Enrolment Office on the 12th of April, 1832.

The specification of this invention commences with an enumeration of the improvements claimed by the patentee, which are first, a method of supplying heated atmospheric air to the furnace, and a method of obtaining sulphurous acid to be used in the process of purification. Secondly. A method of working the retort charges. Thirdly. A method of purifying gas, differing from that usually adopted. And fourthly. A plan, rendering the heat of the coke when drawn from the retorts available in producing a further supply of gas.

For the purpose of supplying the furnace with heated atmospheric air, two sets of flues are introduced, the one to receive the air from the atmosphere, and the other in the proximity of the fire, where it becomes heated to 700 degrees of Fah. or more, as circumstances may require.

This heated air, in conjunction with the vapour from ammonical liquor, lime water, &c. placed under the bars of the furnace, acts upon the sulphuretted hydrogen, and being condensed, produces

sulphurous acid, which is obtained by causing the flue to dip twice in the form of a double syphon, and at the lower extremities of the dips are placed vessels for the reception of the condensed acid.

In the specification is next described an improvement in the construction and application of the retorts, by which a greater quantity of gas of a better quality can be obtained than by the usual process from the same quantity of coals. This improvement consists in making the retort longer, with arrangements for filling and emptying it at each end, and as the charges from each end extend only half the length of the retort, there will always be charred coals at one end, and comparatively fresh coals at the other. Arrangements are also adopted for receiving the gas from either end of the retort at pleasure. The first end of a retort being charged with coals, and the communication between that and the hydraulic main closed, then the gas as it is generated will be forced to pass through the red-hot empty half of the retort, and when this quantity of coals has given off all the gas which can be obtained with facility from it in this way, the second end of the retort is to be charged with fresh coals, when the communications must be shifted so as to cause the gas to pass off at the first end of the retort: by this means the gas from the fresh coals will have to pass over the charred coals and mix with the gas arising therefrom. Thus a greater quantity of gas will be obtained from the coals, and it will be of a more uniform quality than when made in the usual manner. When the gas ceases to come over in proper quantity and quality from this charge, the coke is to be drawn from the first end, and a fresh charge of coals introduced, the communications with the hydraulic main being at the same time changed the gas will principally be generated near the first end, and delivered at the second as before, and so on, alternately charging and changing the communications every three hours with retorts capable of containing a six hours charge.

Mr. Lowe's improved method of purifying gas consists in the introduction of steam under the surface of sulphurous, or other suitable acid, and thereby raise its temperature that the vapour of acid and steam may rise together, and being conveyed through the same pipe or vessel with the gas, the alkaline matter which it may contain will be neutralized. The quantity of steam introduced, and consequently the quantity of vapour raised, must depend upon the quality of the gas to be purified, and the extent of purification can be ascertained and regulated by the application of the usual tests for detecting alkalies or acids.

The fourth improvement proposed by this patentee consists in the introduction of a cylindrical vessel to receive the red-hot coke

when it is drawn from the retorts, that its heat may be applied to the decomposition of other substances, so as to liberate the hydrogen gas therefrom, that it may be rendered available for the purposes of illumination. This vessel is brought up to the retorts on wheels; it is furnished with a hopper to guide the coke into it; the top is then to be closed, and the top fastened down air tight; there is likewise a lid provided for the lower end of the vessel, that it may also be closed at pleasure. The materials to be decomposed for the production of gas are then to be introduced by a pipe entering near the top of the cylinder, and the gas is taken off by one of three pipes introduced at different elevations on the side of the cylinder. The different elevations at which the eduction pipes are inserted, afford the means of taking off the gas from that part of the mass of coke where the heat is best suited to the production of gas.

IMPRESSIONS ON EARTHENWARE.—T. J. Potts, R. Oliver, and W. W. Potts, all of New Mills, in the county of Derby, engravers to calico printers, and co-partners, a patent for "an improved method or process of obtaining impressions from engravings, in various colours, and applying the same to earthenware, &c." was granted on the 17th of September, and the specification was enrolled in the Rolls Chapel Office, on the 14th of March, 1832.

The employment of a rolling press, to print the intended impression on a continuous web of paper, appears to be the principal object of these patentees. The paper, on which the impressions are to be made, is first subjected to the process of sizing. For this purpose, an apparatus, consisting of a sizing trough, in which turns a feeding or supplying roller, over which is placed a sizing roller, both being covered with flannel or printing blanket. These rollers being turned till the flannel becomes saturated with size, a third roller is placed over them, and round this is coiled the web of paper, as it is sized by the pressure of the upper against the middle roller.

The upper roller, with the coil of paper upon it, is then removed to the printing machine. This consists, first of a colour trough, with a roller to transfer the colour to a metallic cylinder, on which is engraved the design to be transferred to the earthenware, porcelain, glass, &c. To the surface of the engraved cylinder is applied a doctor or scraper, consisting of a straight steel blade, extending all the length of the cylinder, strengthened by pieces of metal being screwed to each side of it nearly up to the edge, which is pressed against the cylinder by means of a lever and weight, to remove the superfluous colour. The engraved cylinder is made hollow, that its temperature may be considerably increased during the operation of

printing, by passing steam through the axis on which it turns, while the colour in the trough is preserved in a fluid state also by steam, for which purpose it is furnished with an exterior casing and communications from it to a steam boiler.

The paper to be printed is then to be passed through between the engraved cylinder and a pressure roller, by which process, are transferred to it a series of impressions, as they have been engraved upon the cylinder. The paper is then to be cut into such pieces as may be required to be applied, to communicate the impressions to the earthenware, which part of the process is to be effected in the usual manner.

When it is necessary (as it is stated to be sometimes) to engrave the intended design on a flat plate, heat is to be communicated by placing the plate over a steam metallic box, instead of over a charcoal fire the usual way, and making it to traverse forwards and backwards, by means of a crank and connecting rod, care being taken, by stuffing boxes, to preserve the communication between the steam-boiler and heating box.

Lamps.—To T. Duncomb Bradford, North America, but now residing in Dorset Place, Mary-le-bone, a patent "for improvements in lamps," was granted on the 4th of October, 1831, and the specification was deposited in the Rolls Chapel Office on the 4th of April, 1832.

This invention, which is stated to be the communication of J. Andrews, residing in New Jersey, United States, consists of an arrangement for bringing the oil to be burned in the lamp near enough to the flame that it may be decomposed, and the gas thereby liberated to constitute the flame.

The arrangement proposed is this: the oil to be consumed is brought from a reservoir in a pipe to the burner, where its altitude is regulated by any of the plans usually adopted for regulating the supply of oil to the burners of lamps. The supply pipe is made to terminate in a small tube, which is surmounted by a bunch of small wires, or else by a piece of very thin copper coiled up, that the oil may be thereby divided and kept suspended between the wires or the folds of copper by capillary attraction. Over the bunch of wires or coil of copper a small metallic cap is placed, which is made to fit air-tight upon a projection from the small tube below the bunch of wires. At the bottom of the metallic cup is a circular enlargement, round which a series of very small apertures are made for the escape of the gas as it is generated within the cap, and these jets of gas burning are intended to constitute the light, and to communicate to

the cap sufficient heat to decompose the oil, and to produce gas within it.

For the purpose of lighting this lamp, a small cup is made to surround the supply pipe immediately below the burner, that there may be burned therein a small quantity of alcohol, or other inflammable spirit, with a view to producing in the metallic cap a sufficient quantity of gas with which to commence the light.

Cocks or Taps.—To C. Beard, of Coggeshall, Essex, Ironmonger, a patent "for an improvement in the construction of cocks or taps for drawing off liquids," was granted on the 1st of March, and the specification was deposited in the Enrolment Office on the 13th of April, 1832.

The cocks proposed by this patentee are of the sluice kind; they are cast in three parts; that which screws or drives into vessels which the liquid is to be drawn, the nozzle from which it is received when drawn, and a flat plate which fits in between them to close or open at pleasure the communication through the cock. In this plate a hole is made, which being brought opposite to the aperture in the cock, opens the communication, and which being shifted from the aperture, either by turning on an eccentric pivot, or else by drawing in an elongated recess, made for that purpose, closes the communication. The two principal parts of the cock are cast with flanches and projecting rims, that they may be screwed together with the movable plate between them. On each side of the plate is placed a stratum of some elastic material, as a thin piece of cork: and, when the flanches are screwed tight up, these permit the plate to be moved with facility, while they embrace it so closely as to prevent the escape of the liquor by its sides. The plate is to be moved, (drawn or turned), by a handle, which may be either permanently attached to it, or made to take off, and fit on when required.

Woollen Cloth.—To W. Wells, of Manchester, Machine Maker, a patent for "a new and improved mode of constructing gig machines, otherwise called raising machines," was granted on the 8th of March, and the specification was deposited in the Enrolment Office, on the 2d of May, 1832.

The improvements of the apparatus for raising the pile, for the purpose of finishing woollen cloth, have been, of late, very numerous, and some of them of considerable importance, having generally proceeded from practical men; and amongst these may be included the invention before us. To obtain the requisite pressure of the teasels

against the surface of the cloth to be raised, appears to be the principal aim of the patentee.

He makes the arms of the revolving drum hollow, and fits into them sliding rods, which carry on their extremities the teasel frames, and, by adjusting screws and steady pins, these frames can be adjusted to act upon the surface of the cloth at any required angle. The distances of the teasels from the centre of motion, and consequently their pressure against the surface of the cloth, is regulated by means of eccentric grooves, placed outside of the revolving drum. Into these grooves are fitted pins, projecting from the movable arms, and thus is regulated their motion. Although the patentee describes, in his specification, all the parts of a gig mill, he confines his claims to those we have noticed; and he states that the most improved kinds of teasels, whether made of wire or other material, can be applied in conjunction with his improvements.

[*Some of the Patents belonging to this No. have been unavoidably postponed until our next.*]

AMERICAN PATENTS.

Specification of a patent for a Machine for Impelling Saw Mills and other works by water, called "Strode's Reaction Wheel." Granted to Joseph C. Strode, *Teacher, East Bradford, Chester county, Pennsylvania, February* 8, 1831.

There is a wooden shaft seven feet six inches long, sixteen inches in diameter at the larger end, and fourteen at the smaller; in the centre of this shaft, is made a round hole eight inches in diameter at the larger end, and six at the other; the area of this hole will vary directly as the power required, and inversely as the sub-duplicate ratio of the height of the head above the centre of the shaft.—*a, a, a, a,* fig. 5, Pl. X. are six hollow arms, six inches in diameter, set perpendicularly in the shaft A, at equal angular and linear distances, forming a true spiral curve from one end to the other. The holes through these arms are three and a half inches in diameter. Near the end of each arm is a hole one and three-quarters inch in diameter, so situated that the axis of the shaft A, is perpendicular to the plane passing through the axis of the hole and that of the arm, and so that a plane passing through the axis of the hole perpendicular to the aforesaid plane, shall be a tangent to the circle formed by the middle point in the axis of the hole, by the revolution of the machine on its axis. The distance of the centre of this hole from the centre of the shaft,

is thirty-three inches, and will vary directly as the power required and the subduplicate ratio of the height of the head above the centre of the shaft A, and inversely as the number of revolutions desired. The area of the hole will vary inversely as the subduplicate ratio of the height of the head, and directly as the power required. The distance between each two of the planes passing through the axis of the arms to which the axis of the shaft A, is perpendicular, is eleven inches, and will not answer to be nearer, because the water from each arm nearer the larger end would impinge against the back of the next arm, and thereby impede its motion; so that if the number of arms be increased, the length of the shaft must be increased in proportion.

The arms are made fast in the shaft by means of a tennon with a dovetail, as represented by figure H, the side of the tennon on which the dovetail is made is rather narrower than the opposite side, and the mortise in the shaft is of the same shape, so that when the wedge, I, is driven in on the side opposite to the dovetail, it will be firm and tight on all sides.

B, is a hollow cylinder eight inches in length with a rim on one end, one inch and a quarter wide, and three-quarters of an inch thick. The diameter of the hole is eight inches, the same as that in the shaft A. Its diameter from out to out is nine inches and a half, half its length; the other half, or the part *h*, is nine inches and a quarter at the shoulder where *g* terminates, tapering to the end, where it is nine inches. This cylinder is let through the plank D, of the trunk, which is three inches thick, with its rim on the inside, which is sunk in the plank three-quarters of an inch deep, or so as to face with the inside of the plank. It is made at the same time firm and water tight by means of eight screw bolts, each three inches and a half long, driven in from the outside through holes made in the rim, where it is screwed up firmly and rendered tight by means of burs. The part *h* is four inches in length, and goes into the cylinder F, which is of the same length, and is made fast in the shaft. It has four wings to keep it from turning. This cylinder is of such a capacity that it will work easily on the part *h*, and at the same time not allow too much play. G is a lead washer one inch and a quarter wide, three-eighths of an inch thick, and its inner diameter eight inches. This washer and an iron follower of the same dimensions, are screwed against the ends of *h* and F', (which are turned so as to face exactly), by means of eight screws going through them and securing into the end of *h*. This is in order to render them water tight.

B, is a cast iron friction wheel, fourteen inches in diameter, running with its periphery, which is turned true, against the iron band F, on the shaft (the band being also turned), thereby supporting the weight of the shaft A, to prevent too much friction on the gudgeon, *h*, of figure E. The gudgeons of the friction wheel run on the middle of the two cross pieces, *d* and *e*, made of wood, which are supported by the upright pieces *b*, *b*, of plank, two inches thick, spiked

at the bottom to the sill C, and made firm at the top by the inch board c, going across from one to the other, and nailed to each.

In the foregoing description are given the dimensions of a machine now in operation, for impelling a saw mill under a head of twenty feet. If a larger or smaller wheel is required, the dimensions of the several parts will vary according to the proportions given.

Some additional power may be obtained by the application of a funnel to each of the holes in the ends of the arms, *a, a, a, a,* &c. the small end of the funnel being applied to the hole, and the wide end standing outward. These funnels may be of small blocks of wood, with a hole bored through the middle of each, and hollowed on the inferior side so as to fit the arms to which they may be attached, firmly, by nails or screws. The holes in the blocks should correspond in capacity and position on the inferior sides with the holes in the arms, and should gradually widen in the true funnel shape towards the outer surface of the blocks These funnels may, or may not, be attached, at the option of the constructor; the machine will operate very well without them, though it is believed, from experiment, with some increase of power with them.

If a reciprocating motion is desired, it may be obtained by means of a crank on the axle of the shaft A. In the machine above described the crank is at the end of the axle: but if the axle a little prolonged, be made to work on a point fixed in a permanent block, placed directly opposite the smaller extremity of the shaft, and in the intermediate space between the end of the shaft and the block, the axle be so shaped as to form a crank, by which the reciprocating movement may be given, there will be less friction, and consequently a gain of power.

JOSEPH C. STRODE.

Specification for a patent for an improvement in the construction of a Bucket Water Wheel, used for the purpose of giving motion to hydraulic works, or machinery. Granted to DEAN S. HOWARD. *Lyonsdale, Brantingham Township, Lewis county, New York. February* 16, 1831.

A COMMON bucket water wheel is well known to be a series of buckets suspended at the end of a certain number of arms passing through a shaft hung up at each end by gudgeons, or pivots. The inside of these buckets is formed by the lining of the wheel; the bottom is a narrow board varying in width with the size and proportion of the wheel, with one edge jointed to the lining, and the other edge extending directly from the centre towards the circumference until it meets the front, which inclines from the circumference inwards on a straight line in a sectional direction till it meets the bottom, which forms the bucket.

The improvements thereon are as follows:

The bucket is detached from the lining of the wheel, so that the air has free access from one bucket to the other all around the wheel; the front is a board warped, or bent, in such a manner as to take

and retain more water, longer than the common wheel; the front is wider than the back, so that all the surplus water must escape over the back, and none be thrown out by the centrifugal force. All the surplus water is directed into the bucket below (which will hold more as the wheel turns), by a board for that purpose forming the lining to the wheel and extending down by the back of the bucket. If thought necessary, the air might have access through the lining to each bucket.

Section of part of Howard's bucket wheel is given at fig. 4, Pl. X.

D. Howard.

Specification of a patent for an improvement in the construction of Steam Boilers. Granted to Levi Disbrow, *city of New York. February* 18, 1831.

The object of this invention is the advantageous application of anthracite, or other, coal, to the purposes of heating water in the boilers of steam engines. The boiler may be made of cast iron or any other usual materials, of any dimensions adapted to the purpose. The water contained in the boiler is heated by means of two, or more, furnaces of a conical (or other) form, erected within the boiler, having their bases, or the grates through which the ashes fall, upon or near the same level with the floor of the boiler. The smoke or gas is discharged from the top of the furnaces, by one or more horizontal cylinders passing through the boiler to its outer surface. Each furnace is replenished with coal by means of a pipe or feeder of a cylindrical or other convenient form, passing from the outer surface of the boiler through the same into each furnace at, or near, its top. Each of such pipes is secured by a door, or other means, at the surface of the boiler, and fixed to the furnace with a flanch or other suitable connexion; and the horizontal cylinders above mentioned are also secured to the top of each furnace with a suitable flanch or connexion.

The said Levi Disbrow claims as his invention the advantageous application of heat to the boilers of steam engines, by means of two, or more, furnaces for anthracite, or other coal, erected within the boiler itself; and as parts of the same invention, he claims the mode of supplying such furnaces with feeders passing into them from the surface of the boiler, and also the mode of discharging the gas or smoke of the coal by a cylindrical pipe, or pipes, extending from the top of each furnace to the outer surface of the boiler.

Levi Disbrow

A section of one of Disbrow's Steam Boilers is given at fig 6, Plate X.

Specification of a patent for an improvement in Carriages and Waggons intended to travel upon Rail-roads. Granted to WILLIAM HOWARD, *Esq. Civil Engineer, Baltimore, Maryland, April* 23, 1831.

BE it known that I, Wm. Howard, of the city of Baltimore, and state of Maryland, have invented a new and useful improvement in carriages and waggons intended to travel upon rail-roads, by means of which the flanches of the carriage or waggon wheels, are prevented from impinging on the rails, when these last vary from a right line in their direction, or, in other words, when there happen to be curves in the location of the rail-road, so that the friction of the flanch against such curved rail, is entirely saved; or, if the flanch should occasionally touch the rails, is so much reduced as to afford no material additional resistance. The contrivance, mode, or invention, by which this most desirable result is obtained, is specified in the following words, which contain a full and exact description of the construction and operation of the said machine as improved by me; and which is also illustrated by the accompanying drawing, which is made a part of this specification.

I employ two wheels, placed at a convenient distance in front of the carriage, or waggon, which I call *governor wheels*, and whose axis of rotation is always kept parallel to the axis of the fore wheels by a frame constructed for the purpose. Each of these wheels is composed of two parts, acting separately and distinct from each other—that is to say—the flanch, and the tread, or bearing part of the wheel. The bearing part of the governor wheel is made to revolve upon the axle, while the flanch is made fast to the same axle. The axle of the governor wheel is divided into two parts, on the inner ends of each of which is placed a bevel cog wheel, which two bevel cog wheels work into a third, placed on the side next the fore axle of the waggon wheels, and parallel to it; so that while one half of the governor wheel axle turns one way, the other half turns in the opposite direction. The three bevel wheels here mentioned are supported in a convenient frame, which also keeps the two parts of the governor wheel axle revolving on the same right line; all which is represented in fig. 3, of the drawing. The centre bevel wheel, which effects a change of direction in the opposite parts of the governor wheel axle, moves upon an axle, which extends to, and under, the fore axle of the waggon wheels, and on the end of which is an endless screw. This screw works the end of one arm of a horizontal lever provided with teeth for the purpose, whose fulcrum is in a frame under the axle of the fore wheels and near one of the hubs, and whose other arm, which is bent horizontally at right angles with the first, is connected with and acts upon a horizontal bar, or arm, fastened to the axle of the hind wheels, as represented in figures *one* and *two* of the drawing. The wheels of the waggon revolve upon their respective axles, and the fore and hind axles, besides the usual coupling bar, are so connected, as that the axles may always be in the position of the radii or the curve on which they may be moving,

according to the specification, or on the principle, of a patent heretofore obtained by me, for an improvement in rail-way carriages.

Now it is plainly to be seen that the carriage, or waggon, with its governor wheel, when travelling on a straight rail-way, will not have the flanches of any of the wheels to impinge against the rails. On arriving at a curve, however, the flanch of the governor wheel immediately comes in contact with the outer rail, and the friction there, causes it to turn round, together with the bevel wheel attached to it. The second, or intermediate, bevel wheel, is then set in motion, and the endless screw at the end of its axle, moves the lever that is connected with the bar from the hind axle; which, of course, changes the direction of that axle, and in so doing changes also, by the peculiar coupling aforesaid, the direction of the fore axle; and both the fore and hind axles are thus, by the friction of the flanch of the governor wheel upon the rail, brought into the position of radii of the curve upon which the carriage, or waggon, is then travelling, without the flanches of the main waggon or carriage wheels coming in contact with the rails.

The invention and improvement here specified may be applied at once to the fore wheels of the carriage, or waggon, which would then be governor wheels in their construction and mode of operation.

What I claim as new, and as my own invention and discovery, in the above described machine, and for the use of which, I ask an exclusive privilege, is the separation and distinct action of the flanch, and the tread or bearing part of wheels to be used on rail-roads; and I also claim as my own, and as new and original, the particular combination by which the effect is produced, as described, and set forth in the above specification.

Wm. Howard.

Explanation of the Drawing, Figures 1 and 2, Plate X.

Figure 1, represents a side view of the carriage. In this, every part of the carriage that is not peculiar to the present invention, and which would interfere with its representation, is omitted.

Figure 2, is a plan of the carriage. In this, the main coupling bar between the axles, seen in Fig. 1, is omitted; and the fore axle is represented by the dotted line. This arrangement permits the endless screw and the levers that effect a change in the direction of the axles, to be seen.

Figure 3, is a front view of the governor wheels, showing the manner in which the axle is divided, the bevel wheels, and the separation of the flanch and tread of the governor wheels.

TRANSACTIONS OF THE SOCIETY OF ARTS, &c.

Continued from page 122.

IMPROVEMENTS IN MICROSCOPES.

Two large silver medals were respectively voted to Mr. W. Valentine, of Nottingham, and to Mr. Cornelius Varley, of Charles

Street, Somers' Town; to the former for his microscope for botanic sections; to the latter for his microscope for live objects. Mr. Valentine being engaged in a course of botanical dissections, and not finding any of the microscopes now on sale quite adapted to his purpose, has selected from various instruments those particulars of construction which best suited the object he had in view, and has likewise availed himself of the suggestions of friends, to whom he very frankly gives all due credit; and the result has been an instrument better adapted to the use of the botanical physiologist than any other at present extant.

In Mr. Varley's microscope the most prominent improvements are, an arrangement of two parallel bars, forming a kind of bridle or handle, with a universal motion, by means of which the stage, and therefore the objects on it, may be moved in any direction, so as to keep them continually in the field of distinct vision; a beautiful and simple movement, peculiarly adapted to the examination of live animalculæ. Also a dark chamber under the stage, through the variable apertures of which the pencil of light is made to pass, of a diameter no greater than the power of the lens absolutely requires; a contrivance which, by cutting off all extraneous light, brings the pencil of rays in contact with absolute darkness, and thus causes the least difference of refractive power in the parts of objects to render them distinctly visible.—Trans. vol. xlviii. Pr. p. xiii.

DIVIDING ENGINE.

The *gold Isis medal and fifty guineas* were presented to Mr. Andrew Ross, of St. John's Square, for his improved method of dividing astronomical and mathematical instruments, and for his circular dividing engine.

Among the arts which are necessary to produce accurate astronomical and mathematical instruments, that of dividing, being one of the greatest importance, has, since the time of the earliest astronomers, been practised under various forms in its progress towards perfection.

The first method of which we have any correct account is that by beam compasses; these were employed by Graham, Sisson, and Bird. Graham and Sisson obtained the chord of the arc of 63° from the radius, and completed the number of divisions on the quadrant by bi-, tri-, and quinquesection. Bird computed the chords of such arcs so that when taken from an accurate scale of equal parts, and marked upon the quadrant in their proper order, he obtained the point of 85·20, and then completed the number of divisions by continual bisection.

In the interim, Hook and Roemer practised other methods, widely differing from the above and from each other. Hook's method consisted in racking the quadrant with an endless screw. Several trials of this were made at the Greenwich observatory, but the method was found defective, and was soon abandoned. The method of Roemer was, stepping a fixed distance throughout the whole of his arc, the distance being so proportioned to the radius of the arc that it

was very nearly equal to one of the smaller divisions required; the total length of the arc in this case being disregarded, as any number of divisions were converted into degrees and minutes by a table calculated for the purpose. This method has defects which render it useless, because any error arising from the inclination of the dotted points or the porosity of the metal, is chargeable upon the whole arc, so that no dependance could be placed on the result; for his table supposes the whole arc to be truly divided.

About the time of Bird, the Duc de Chaulnes published a method of dividing by micrometer microscopes, and several temporary pieces of brass having divisions upon them. Two microscopes, having cross wires in the foci of their eye-glasses, were fixed to a frame, and considered as the points of a pair of beam compasses; these were extended to a diameter of the circle, and two of the temporary pieces of brass were attached to the circle by means of wax underneath the microscopes, so that the divisions bisected the crosses in them; then the circle was moved half round, and, if required, the position of the micrometers and pieces of brass was changed, and the operation repeated until they were diametrically opposite. A cutting-paint was then placed over one division and a fixed microscope over the other, so that when any division was brought to bisect the cross in the microscope, the cutting-point made one diametrically opposite. By the process of trial and adjustment with bisections and trisections, the circle was divided into spaces of 10°; then, by obtaining the arc of 9°, by trial in the arc of 180°, the circle can be divided into spaces of 1°, and by similar means into similar spaces if required.

Ramsden's method of dividing consists in the use of the beam compasses as employed by Bird, and the method of the Duc de Chaulnes combined. The circle is first divided by the beam compasses, and the position of the dots accurately ascertained by means of microscopes, and corrected accordingly, by pressing the dots with the points backwards or forwards by the hand. This method is capable of a great degree of accuracy, but is tedious in the extreme.

The next great improvement was effected by Mr. E. Troughton, in whose hands the art has arrived at a high degree of exactness; but there are various difficulties in the application and construction of the apparatus, which it has been the object of Mr. Ross to avoid, by adopting principles perfectly independent of mechanical action, and governed only by vision, aided by the most powerful optical means.

The roller used by Mr. Troughton is wholly rejected, and the apparatus employed is so constructed, that the character of the circle to be divided, whether slightly porous or defective, does not affect the accuracy of the operation. The method of cutting the original divisions is simple and rapid, and in number they scarcely exceed one-third of those employed by Mr. Troughton; thus reducing the labour of observation and computation, while a great practical convenience is gained by making each original division a division of the

circle. The construction of the apparatus is firm, and its motion free from elasticity and friction; and when once adjusted, the accuracy of the divisions depends entirely upon the permanence of certain parts, which are so secured as to prevent the possibility of derangement. From the time of cutting the original divisions to the completion of the operation, the circle is free from any attachments of dividing apparatus, and is only viewed through the microscope, so that the ultimate dependence is upon vision.

For a full description of this beautiful machine, with elaborate engraved illustrations, we must refer our readers to the Society's volume xlviii, p. 302 to 332.

TIDE SEMAPHORE.

The *gold Isis medal* was presented to the Rev. Griffin Stonestreet, of Haltin, near Hastings, for his tide semaphore.

At most ports which cannot be entered at low water, a flag in some conspicuous station is hoisted when the tide has risen so as to afford on the bar or in the harbour, eight or ten feet of water, as the case may be, and is kept displayed till, by the fall of the tide, the water is deduced to the same depth that it was when the flag was first hoisted. A flag in these circumstances indicates when a vessel of the minimum draft of water may safely enter the harbour; but as it shews neither the actual depth of water at any particular time, nor whether the tide is rising or falling, it may well happen, that a vessel making for the harbour just before the flag is lowered may get aground, or, from fear of such an accident, may not choose to stand for the harbour, though the actual depth of the water may be such as to make it quite safe. The object of Mr. Stonestreet has been to substitute for this vague, and sometimes deceptive indication, a method which shews, not only the depth of water in feet at any particular time, but also whether the tide is falling or rising.—See Trans. vol. xlviii, p. 72.

IMPROVEMENTS IN SHIPS' RIGGING.

The *large silver medal* was voted to Mr. J. Bothway, R. N. for his mode of securing the lower yards of ships of war.

Mr. Bothway's invention is peculiarly applicable to men of war; and has been adopted in fitting out some line-of-battle ships at Plymouth. It is not of a nature to be made intelligible in the space we can at present afford.—See Trans. vol. xlviii. p. 137.

LIFE RAFT.

The *large silver medal* was presented to Alfred Canning, Esq. of 54, Richardson Street, Bermondsey, for his life raft, a model of which is placed in the Society's Repository, and a description in vol. xlviii. p. 291.

LIFE PRESERVERS FROM FIRE.

Three inventions are recorded in the present volume of the Society, the object of which is to afford the means of escape to the

inmates of a house on fire. To the Chevalier Aldini, of Milan, the *gold Isis medal*, for his armour of wire gauze lined with asbestos, or with woollen cloth soaked in a solution of alum, which will enable the wearer to traverse a sheet of flame, during fifteen or twenty seconds, without injury.—*Ibid.* p. 141.

To Mr. J. Braidwood, of Edinburgh, for his chain-ladder, the *large silver medal.*—*Ibid.* p. 146.

And a similar reward, with the addition of *ten pounds*, to Mr. J. Henfrey, for his fire-escape, which consists of a jointed metallic ladder, very ingeniously constructed, so as to be flexible enough to be rolled round an axis, and thus to pack in a small compass, while when extended, it has sufficient stiffness for the use to which it is applicable.—*Ibid.* p. 154.

MUZZLE FOR CRIB-BITING HORSES.

The *large silver medal* was awarded to Mr. T. R. Yard, of Dean Street, Soho, for a muzzle for crib-biting horses. This muzzle, while it allows the horse to eat and drink, prevents him from biting the manger. It is therefore effectual when on, and offers a fair chance of curing the animal if applied in time, provided the habit have arisen from mere imitation and not from any disease.—Trans. vol. xlviii. p. 95.

IMPROVED DOWEL BOX.

The *silver Isis medal* and *five pounds* have been voted to Mr. Samson Travis, of Gray's Street, for an improved dowel box for boring sashes, by means of which the pieces of which they are composed may be put together with greater expedition and accuracy than usual.—*Ibid.* p. 127.

EMERY CLOTH.

The *silver Isis medal* and *five pounds* were voted to Mr. Louthorp for his emery cloth. (See description, *Register*, vol. v. N.S. p. 309).

APPARATUS FOR BINDING TINNED PLATES.

The *silver Isis medal* and *five pounds* were presented to Mr. J. Bassett, of Birmingham, for his method of bending pipes of tin-plate, and making laps or folds in the same material. The former of these objects is effected by filling the pipe with hard solder, and then bending it by means of two rings of soft solder. For making laps or folds in tin plate, he employs an iron cylinder, with longitudinal cuts in it adapted to the various proportions of the folds that different works require. The edge of the tin-plate being placed upright in the cut, the cylinder is turned so as to bring the plate sharply against the jaw of the block which contains the cylinder, and thus gives a perfectly straight bend to the plate, more expeditiously and more accurately than can be done by a hammer.—*Ibid.* p. 244.

DOUBLE DRIVER FOR LATHE CHUCKS.

The *thanks* of the Society were presented to Mr. James Jones, of Well Street, for a very simple and effectual double driver for a lathe-chuck.—*Ibid.* p. 241.

MACHINE FOR WEIGHING COAL SACKS.

The *large silver medal* was voted to Mr. James Braby, Duke Street, Stamford Street, for his machine for weighing coals in sacks. The introduction of a bill into the late Parliament for the sale of coals in the metropolis by weight instead of by measure, was the occasion of this invention. Its principle is that of the steel-yard; and with one fixed and one movable weight, it will weigh sacks of coals considerably above or below the average weight, and, after a sack has been emptied, the weight of it is found by the movable weight alone. The whole machine packs up in a box of small size, which is carried beneath the tail of the waggon, and when in use is supported by a horizontal sliding bar attached to the frame-work.—*Ibid.* p. 288.

SURGICAL APPARATUS.

Of surgical apparatus, the Society, under the advice of their professional members, have awarded a *large silver medal* to Stafford Benson, Esq., of Jewin Street, for his bed for reducing dislocations, which is at present in use at Bartholomew's hospital; a *large silver medal* to J. C. Jerrard, Esq., of Honiton, for his bed of invalids, of which, perhaps, the chief novelty consists in a simple method of changing its position from horizontal to any necessary degree of lateral obliquity; a *silver Isis medal* to C. Verrall, Esq., of Seaford, for his prone couch, whereby patients are enabled to repose face downward, a position which, in certain cases, contributes both to their ease and to their cure; and a similar *medal* to Mr. Bunney, of Lower Eaton Street, for his surgical belts.—*Ibid.* pp. 296 to 301.

JACQUARD LOOM.

The sum of *ten pounds* was presented to Mr. S. Dean, an ingenious silk-weaver, of Bethnal Green, for his proposed machine for punching pattern cards for the Jacquard or Lyonese loom, and the *silver Isis medal* and *ten pounds* for his improved silk-loom. To Mr. W. Jennings, a machine maker, of the same place, were presented the *large silver medal* and *fifteen pounds*, for sundry improvements made by him on the Jacquard loom.

This is the second improvement in the machinery of the Lyonese loom for weaving figured silks which has been given to the public by the Society; and it may not be uninteresting, on this occasion, to bring into one point of view, the successive ameliorations which the art of silk-weaving has received, and particularly those which have been described in the preceding volume of the Transactions.

It has appeared useful to do this, notwithstanding the various existing accounts of the silk manufactures, among which may be

distinguished the elegant Treatise forming part of Dr. Lardner's Cyclopædia, because all these have been published by individuals who could possibly expend the sums on drawings and engravings required for the full illustration of such intricate machinery; but which the Society has, in the course of a long series of years, been enabled to do in the most ample manner.

Before referring to the subject of weaving, it may be well to state that the Society's Transactions comprise the most elaborate, and perhaps the best, accounts of all the previous operations, from the breeding of the worms up to the period that the silk comes into the hands of the weaver. On the first of these, and on preparing the silk from the cocoons, we may confidently refer to the long and and interesting paper of Mr. Stephenson, in vol. xliii.; and as regards the subsequent process of combining the original filaments to form others of greater strength, a description will be found in vol. xli. of an improved engine for what is called *throwing*, after which the silk is ready for the weaver.

The distinction between plain and figured wearing is fully pointed out in the description of Mr. Richards' invention, in vol. xl. of the Transactions; and premising this to be understood, it is necessary only to state, that the complicated and varying operations required to produce *figures*, were, prior to the year 1807, effected by a boy or man in constant attendance on the weaver, who, by means of previously arranged and very numerous cords, raised or depressed in a certain order those parts of the harness required to produce the pattern.

The expense, and, above all, the inconvenience of subjecting the weaver to the costly, and sometimes careless, services of a second person, were long and severely felt; and it was not till the year just named, that Mr. Duff provided the first mechanical substitute for the weaver's attendant. This machine, called a *draw-boy*, from the name of the person with whose labours it dispensed, is described in vol. xxv. of the Transactions; an improvement on it, by Mr. Sholl, is described in vol. xxviii.; and further improvements, made in 1820 and 1821, by Mr. Richards and Mr. Hughes, are, together with most elaborate details of the whole of the best loom then known in England, given in vol. xl.

These were the latest advances made on the original invention of Mr. Duff. About this time, the continued peace of Europe and the increasing intercourse between England and France, enabled the manufacturers of the two countries to become acquainted with the machinery and processes employed by the other; and it was soon discovered that the French had been for some years in possession of a loom, invented by a M. Jaquard, which was almost as much superior to the English *draw-boy* as that was better than the living agent which it had superseded. The first person to take advantage of this discovery was Mr. Stephen Wilson, an eminent manufacturer, of the city of London, to whose disinterested enterprise and exertions the country is much indebted, from the circumstance that the greater height of the French, as compared with the English loom, required

new and very lofty buildings to be erected for its introduction. The requisite expense to make the experiment was, nevertheless, hazarded by Mr. Wilson; and the result, as regards the general benefit of the trade, fully justified its expectation; so complete, indeed, has been its success, that in a very years the old *draw-boy* will probably be unknown.

The general use of the Jacquard loom has hitherto been much impeded by its great height, as already mentioned, which, though easily overcome in a single instance, presents a serious obstacle to its adoption by so numerous a body of persons as the silk-weavers, inhabiting buildings adapted only to the existing apparatus. The improvement, therefore, made by Mr. Jennings, consisting in a reduction of its height to the average of English working rooms, will lend a most valuable assistance towards its general introduction. The alteration in question is described in the present volume of the Society, and the accompanying engraving, together with that of the invention of Mr. Hughes, in vol. xlvii., will convey a tolerably complete idea of the nature of the Jacquard machinery. It consists, mainly, of an indefinite series of cards, variously punched with holes, which revolve round a square bar, and, coming successively in contact with the machinery prepared for them, affect as variously the harness of the loom. To change, therefore, the series of cards, is alone required to change the pattern of the work; and to resume an old pattern, it needs only to attach the cards which had formerly been employed. There is scarcely any limit to the number of cards which shall form the series, and of course as little limit to the length and variety of the pattern. The labour of causing such an endless band of cards to revolve is the smallest conceivable, their expense is trifling, and their durability great. The contrivance, in every respect, does the highest honour to the inventor; and though it may probably receive some slight modifications, it is likely to maintain for many years its important place among the aids to manufacturing industry.—*Ibid.* pp. xxiii.—xxvii.

EXTIRPATING STUMPS OF TREES.

The *large gold medal*, being the premium offered, was voted to Sir JOHN JAMSION, President of the Agricultural Society in the Colony of New South Wales, for a successful method of extirpating the stumps of trees in the conversion of natural forest into arable or pasture land. It is with much pleasure that we insert Sir John's communication to the Society, as we make no doubt the information it contains will be found of immense importance to all new settlers in the wilderness, and especially so at the present time, when emigration from this country is taking place to an unprecedented extent.

Regent-Ville, New South Wales,
24th May, 1830.

SIR,

Observing that the "Society for the Encouragement of Arts, Manufactures, and Commerce," has offered a premium for the best method of extirpating the stumps and roots of trees, I beg leave through you to submit the method described in the accompanying ad-

dress I delivered to the Agricultural and Horticultural Society, as my discovery, which method is in high approval, and general adoption and practice in this colony. I am, Sir, &c. &c.

To A. Aikin, Esq. JOHN JAMISON.
Secretary, &c.

In the early part of 1825, 600 acres of forest timber were felled nearly adjoining my house at Regent-Ville, and remained untouched until September 1828, when about thirty labourers were employed to grub up the stumps and to burn off the timber. But, on trial, the long drought had rendered the ground so hard, that hoes and spades made such slow progress in clearing the earth from the roots, and the dry and hardened state of the wood made the execution of by means of axes so laborious and tedious in barking and sapping the stumps and cutting the roots, that this usual method of burning out the stumps was abandoned. But as the above extent of forest was felled for a park and pleasure grounds, and not intended for agricultural purposes, I determined to get clear of the unsightly appearance of the stumps, by burning them off to the surface of the earth with the felled timber which surrounded them.

As an experiment, twenty acres were ordered to be cross-burnt, in the customary way, with riders, into convenient lengths, which, owing to the dry state of the timber, was completed with ease and expedition. A considerable number of logs were directed to be rolled close round each stump, and when completed the entire twenty acres were set fire to on the same evening. The following morning about one-third of the whole stumps had burnt out even to the extreme points of the roots, many feet under the ground: and as the whole were in regular course of consumption, a few men were left to attend to the fires when necessary. Thus, in four or five days, ninety-nine stumps with their roots, out of every hundred, were burnt most perfectly without the use of a cross-cut saw, spade, or axe; and, by this method, more than double the extent of work was performed, and in a much more complete manner, than any other mode hitherto followed could have effected, and certainly with much less bodily labour. This plan was persevered in until upwards of 400 acres were cleared, and the stumps were burnt out in a much more perfect manner than had been before experienced. Some of our honorary members, vice-presidents, and many members of the Society, witnessed the progress and effect of the above method of clearing felled forest timber; and as the plan is generally well known and adopted in this neighbourhood, its saving of labour, and many advantages must soon bring it into general use.

It may be necessary to offer some further remarks in illustration of this method of felling and clearing tracts of forest land in the way described. The soil of the 400 acres cleared was argillaceous, combined with a red vegetable mould, which might be considered of a middling quality of forest ground. The felled timber consisted of iron-bark, box, stringy-bark, gum, and apple-tree, so that it was a perfectly mixed forest. The apple and box-tree stumps burned out with the greatest facility and expedition; the iron-bark next,

and the gum and stringy-bark slowest. The last, however, burnt out perfectly, though some of them required more fuel and attention than the former.

I have also to observe, that the wood was felled at that period of the summer when the sap was raised from the roots to the trunks of the trees, to give growth and vigour to the branches and foliage. This is a period of much importance in the economy of clearing land of its forest, inasmuch as the tree is cut down when the stump is exhausted of a considerable portion of its vegetable sap, and, in consequence, the roots very generally die, and dry up the better for burning out. On the contrary, when trees are felled in the winter, the stumps and roots are invigorated with the return sap, and the ensuing spring very commonly forces out shoots from the stumps and suckers from the roots, which keep them alive, and render them difficult to grub up or burn off; besides the additional labour necessary to destroy the young forest, which will spring up by using injudicious seasons in felling wood. It must likewise be acknowledged, that the two seasons of drought not only occasioned an unusual dryness of the timber, but of the earth also, which assisted the success of the plan of burning out the stumps. Besides this, the argillaceous mixture of the soil promoted the burning process; as the earth, ignited by the fire of the logs and stumps, continued its course until the extreme points of the roots were consumed. This experiment establishes a fact, that our former mode of opening the earth round the stump removed that quality of soil driest and best calculated to ignite and conduct the mutual burning influence of the wood and earth, so long as any of the former remained unconsumed. After the fall of rain, which took place in the middle of the month, the ground became so saturated and the timber so wet, that it was found the success of the plan would be retarded; therefore, during this state, the people were employed in rolling logs round the stumps, and after a few days of dry weather, the fires were again lighted, when they burned with the former facility.

The above experiment was tried on dead sapless stumps, situated on rich alluvial soil, where it answered to a degree to make me lament having burnt the wood off many hundred acres, and subjecting myself to the increased labour and expense of grubbing the stumps up by the roots, or drawing wood from a distance to burn them out from the surface.

I feel perfect confidence in the certain success of the method now described to you for clearing forest ground. It will always succeed if the timber has been cut down when the sap is up, and allowed to season from two to three years, when the stumps will be dead, and the timber dry and exhausted of its sap, so as to burn off in the radical way submitted to your notice. But the ground must be dry, and either of argillaceous or rich vegetable mould. Gravelly or sandy soil will not conduct the fire below the surface.

The economy of the plan will not be so available to new settlers, requiring a spot of cleared ground for immediate cultivation. They must, for the first year at least, follow the old, tedious, and expensive method of grubbing out the stumps or clearing the earth round

them, cutting off the bark and the sap, to succeed in burning them out a requisite depth to allow the plough to work over them. But the felling at the proper season such tracts of forest as may be desired to be cleared, will, in the course of two or three years, enable them to adopt with facility the economy and expedition of the method recommended, which is not only important to be known and acted upon in this territory, but in the great forest wilds throughout the globe, where civilised man desires to raise his bread.

Whilst on this subject, it may be well to explain another method which I have practised in progressively clearing forest pasturage land by felling the young sapling-trees and wattles, and burning them and the unsightly standing dead skeleton-trees with the quantity of dried felled timber so generally strewed over the forest tracts. Cutting down the young trees admits a freer circulation of air, and of the sun's rays, to sweeten and improve the quality of the herbage; and the quantity of food is considerably increased by clearing the naturally fallen trees and branches which are so plentifully scattered on the ground. And besides, burning off the decayed timber destroys many venomous reptiles, dangerous to man and beast; and that which is not the least reward of his plan is the beautiful and park-like appearance which it gives to as estate. The improved quality and quantity of food, following such a system of clearing would amply repay the labour it costs, and if followed up every third year, forest pasturage would be progressively made more valuable and ornamental, at an easy expense.—*Ibid.* pp. 432, 434—438.

LIST OF NEW PATENTS SEALED.

Spinning.—To R. Montgomery, of Johnstone, Renfrew, for construction of a machine for a new mode of spinning cotton, silk, flax, and other fibrous substances. Communicated to him by a foreigner. Specification to be enrolled in two months. April 26, 1832.

Steam-boilers.—To Lieut.-Col. Sir C. W. Dance, of Hertsbourne Manor-place, for improvements in steam-boilers.—April 28.—Six months.

Machinery.—To J. Holt, the younger, of Whitby, rope-maker, for the application of a mode or process for preparing and manufacturing certain fibrous substances.—April 28.—Two months.

Machinery.—To C. Axon, of Heaton Norris, Lancashire, cotton manufacturer, for improvement in the machines called throstles and doubling frames made from cotton, silk, linen, woollen, and other fibrous substances.—May 1.—Two months.

Grain.—To G. Goodlet, Leith, proprietor of the London, Leith, and Edinburgh steam mills, for a new method of preparing rough meal from ground wheat or other grain previous to their being dressed for flour; also rough meal from ground barley, malt, or other grain, previous to their being put into the mash tun for brewing or distilling.—May 3.—Six months.

Dying.—To R. J. Hendrie, of Blossom-street, Shoreditch, Middlesex, dyer, for an economical mode of improving dyed silks.—May 8.—Six months.

Agriculture.—To J. Heathcoat, of Tiverton, in the county of Devon, Esq. for improved methods of draining and cultivating land, and improved machinery and apparatus applicable thereto, which machinery and apparatus may be applied to other useful purposes.—May 15.—Eighteen months.

Circulation of Fluids.—To C. A. Busby, of Brighthelmstone, Sussex, architect and engineer, for an improved method of producing the circulation of fluids, through pipes, cisterns, or other vessels, applicable to the warming or cooling the interior of buildings, and to other purposes.—May 15.—Two months.

PATENTS ENROLLED BETWEEN 10TH MAY, AND 10TH JUNE, 1832.

Particularizing the Offices in which the Specifications may be inspected with the Dates of Enrolment.

RUDDERS.—To A. H. Holdsworth, of Dartmouth, Esq. a patent for "improvements in the construction of rudders, and in the application of the same to certain descriptions of vessels," was granted to the 19th of November, 1831, and the specification was lodged in the Enrolment Office on the 19th of May, 1832.

Mr. Holdsworth proposes to connect the rudder with the stern of the vessel to which it is applied, in such a manner that it may be at liberty to make a complete revolution on its axis of motion. By this arrangement the rudder may be applied to the guidance of a vessel, whether she be moving a-head or a-stern, a circumstance of much importance to navigators of steam vessels, who have at their command a stern as well as a head motion, and who are often placed in situations where a stern motion, if effected under the power of the rudder, would be of the greatest advantage.

The nature of the invention will be readily understood on reference to fig. 1, Pl. XI. representing a portion of the stern of a vessel, with the revolving rudder attached. *a a* is the axis on which the rudder revolves, shown separately by fig. 2, furnished with a pivot or gudgeon *b* at its lower extremity, which turns in a socket *c* on a projection from the keel, as shown in the drawing. The upper part of the rudder's axis passes through and turns in an eye *d*, immediately over the place where the leaf of the rudder begins to project from the axis, and another eye *e*, upon the deck, immediately under the tiller. All these bearings are firmly secured to the vessel by strong iron straps, of the usual construction, and the parts of the axis which turn within them are secured from wear and injury by iron hoops at the upper bearings, and an iron pivot at the lower. *f f* is the leaf of the rudder, made to turn freely on its axis, without touching the stern post. *g* is the tiller, turned up at its end, and furnished with a swivel *h*, and two eyes for the tiller ropes to act with facility in whatever direction the tiller may be used. Over the eye *e* is placed two washers, shown at *i*, fig. 2, and these are kept in their place by means of a key *k* passing through the axis immediately over them, and thus is obtained a support for the rudder.

On the advantages of this invention, the patentee, in a pamphlet recently published, observes, that "by this construction of the rudder, steam-vessels intended for war purposes will become doubly useful, particularly when attending a fleet at sea; as they may move

from ship to ship, either to one out of the line, or from a place of danger upon a lee-shore, or to speak to another which is astern, without the necessity of turning—an operation which, from the length of the steam-vessel, and particularly when on a lee-shore, or in the midst of other ships upon the wing, is attended with inconvenience, and frequently with great danger.

"To a steam-vessel armed as a gun-boat, this rudder will afford the power of keeping directly to windward, with the head always to the enemy. Such vessel, properly constructed, may alter her position and retreat against the wind and sea, with perfect safety to the rudder, and without exposing it or her broadside to the fire of the ship or fort with which she may be engaged; an advantage which can only be estimated by those who can fully comprehend the details of so important a branch of naval warfare as steam-vessels are likely to become.

"Another disadvantage connected with the navigation of the present steam-vessels, cannot have escaped observation—the space which they require for turning when their course is to be reversed.

"Take, as an example, the situation in which one of these vessels would be placed in a fleet, either attending on men of war, or as a convoy-vessel to merchant-ships. Suppose the fleet running before the wind, and going six or eight knots, and that the steamer had occasion, when surrounded by vessels, to get into the rear of the fleet—to reverse her engines would subject her to the loss of her rudder from the first sea that struck it, whilst to wind under such circumstances could only be effected with great danger to herself and to those vessels whose course she would thwart: a remedy therefore for these difficulties is most desirable. It is well known to seamen, that, in proportion as the length of a vessel is increased (particularly when understood as the length when compared with the breadth), that the space necessary for winding is proportionably enlarged. This difficulty in sailing-vessels is, to a certain extent, counteracted by the skill of the commander, in so managing his sails as to assist the rudder, and thus give more rapid effect to its operation. The commander of the steam-boat is deprived of this advantage, as the power by which the latter is moved is always operating equally on both sides of the vessel, and in a direction parallel to the keel—a circumstance which renders the loss of her rudder of far greater moment than that of any other vessel, as she is deprived of the only means by which she can be guided. There are indeed persons, who taking (as it is presumed) a superficial view of the subject, propose to disconnect the two wheels, and to use them separately as the oars of a boat, when, an engine being appropriated distinctly to each,

they may be moved in opposite directions; and thus the turning of the vessel may, as they believe, be greatly facilitated. It would be foreign to the present subject to go into detail on the mechanical objections to this plan for steam-vessels fitted in the usual way; engineers who are employed in this branch of art will adduce ample objections to its accomplishment. Such reference, however, is unnecessary; as the length of these vessels, when compared with the short distance between the wheels, must present an insuperable barrier to any great improvement being anticipated from such a change in the motion of the wheels, if it could be accomplished with safety to the machinery, and if the power of the engines could be preserved; unless a mode can be found of reversing the operation of the lever, and the shorter can be made the more powerful of its arms; of the truth of which, the difficulty of turning a long boat, even when backing water with oars half the length of her body, will afford ample proof to the seaman who will fairly apply his judgment to the subject.

"For barges navigating rivers and canals, it offers as extensive an improvement; as it will enable those vessels with safety to enter narrow channels, from which they would be excluded if unable to come out without turning round. It is well known to those who are acquainted with the general principles of navigation, that the longer the vessel can be made for inland purposes, the better, as she may carry a large cargo, although narrow and of light draft of water. This rudder, therefore, will afford the means of trading with larger vessels in shallow water and confined branches of rivers, where very small boats alone, of ordinary construction, have hitherto been enabled to float."

Paddle Wheels.—To E. Galloway, of Blackfriar's Road, Engineer, a patent "for improvements in paddle wheels," was granted the 17th of January, and the specification was lodged in the Enrolment Office on the 17th of May, 1832.

This invention consists in placing the paddle wheels upon two axes, placed at an obtuse angle with each other; the axis of the outer portion of the wheel being made to take an inclination descending from the extremity of the axis of the inner portion of the wheel. The precise angle is not given, as the patentee states that his paddles will answer at different angles, and refers to the drawing annexed to the specification as exhibiting an advantageous angle: this appears to be about 120 degrees. The exterior end of the horizontal axis is connected with the interior end of the inclined axis by means of an universal joint on the principle of that known by the name of

"Hooker's joint," by which the motion of one axis can be transmitted without the intervention of wheel gearing, though the driven axis deviates from the axis of the driver. By this inclination of the axes, the paddles are caused to approach and nearly touch each other as they enter the water and come into action, and to recede from each other as they come out of action and leave the water. The leaves of the paddles are not placed at right angles to the plane of the wheels on which they are fixed, but those on the portion of the wheel next the vessel have their inner edges projecting forwards, and their outer edges projecting backwards; while those on the exterior portion of the wheel have their inner edges projecting backwards, while their outer project forwards, and thus when the paddles approach each other in the water, they form an angle embracing a large portion of the water to form a good resistance or fulcrum for the propulsion of the vessel, and when they begin to rise out of the water, they will at the same time begin to recede from each other, and allow the water to escape between them.

It is very evident, from the almost innumerable plans which have been devised for the improvement of the common paddle wheel, that its defects are more easily discovered than remedied; though many plans have been devised to obviate the oblique action of the leaves of a common paddle wheel, they have generally rendered its construction more complicated, or its stability less certain. The plan before us, which is not the first effort of the ingenious patentee in this line, for he patented in 1829, which has been tried, it is said, with complete success on board the Confiance government steam vessel, is not deficient in novelty; but we fear the plan of transmitting motion by means of Hooker's joints is not well suited to a resistance so variable and uncertain as steam vessels have to encounter in stormy seas.

Cordage.—To R. W. Sievier, of Southampton Row, Bloomsbury, London, Gentleman, a patent "for improvements in the manufacturing of cables, ropes, whale fishing, and other lines, lathe and rigger bands, &c., and applicable to other purposes," was granted on the 1st December, 1831, and the specification was enrolled in the Rolls Chapel Office on the 1st of June, 1832.

The ingenuity of this patentee has been developed much more extensively in finding applications for his invention than in the invention itself, which simply consists in the application of strands of caoutchouc or Indian rubber, instead of strands of hemp or flax, in the manufacture of ropes. The Indian rubber is to be separated into slips of appropriate dimensions, and then drawn out till they are

reduced to the thickness required for a strand. Seven, or any other convenient number of the strands, are then placed together longitudinally, and secured together by hemp, flax, cotton, woollen, or other fibrous substance, or by straps of leather or other suitable material, being woven, knitted, netted, or plaited over the Indian rubber strands. In the manufacture of larger cordage, seven, or any other convenient number of last are to be bound together in a similar manner, and then as many of this second size are to be united as shall make a cable if required.

The other purposes besides the cables, ropes, whale fishing and other lines, to which this invention is said to be applicable, are travelling bags, purses, or similar articles where the difference of the magnitude of their contents render elasticity in the containing bag of importance.

Carding.—To D. Selden, of Liverpool, Merchant, a patent "for an improved cording and stubbing engine for wool and other fibrous substances," was granted on the 22nd of November, 1831, and the specification was enrolled in the Rolls Chapel Office on the 19th of May, 1832.

In August last, Mr. Selden specified a patent for improvements in machinery used to give a degree of consistency to, and to wind on to bobbins, barrels or shools, rovings of cottons, and the like fibrous substances, by the pressure of two flat plates covered with leather, and made to move, with the rovings between them, in different directions, at right angles to the direction in which the rovings are moving. He has, on the present occasion, specified a plan by which the number of parts of a carding engine are diminished, and the processes of spinning simplified. The modifications proposed, however, are so numerous and intricate, that we should be unable to make a description of it clear without illustrative drawings far more minute and extensive than our present opportunity affords us to introduce, and therefore we must limit our notice to the statement of the patentees object, which he proposes to carry into effect partly by the employment of two combs to take off the wool from the carding cylinder at different places, the one being made to penetrate deeper than the other, so that the wool will be separated into two portions, with fibres of different lengths; and consequently the one portion will be suited for the warp, and the other for the weft of the cloth to be manufactured of the materials spun by this machine.

Iron Manufacture.—To Mr. Teague, of Park End Iron Works, near Calford, Gloucestershire, Iron Master, a patent "for improvements in making and smelting pig iron," was granted on the 17th of January, and the specification was lodged in the Enrolment Office on the 17th of May, 1832.

When iron ore is raised from the mine, it must be first subject to the process of roasting, to separate from it the arsenic and sulphur, with which it is combined. The roasting of iron ore has been usually accomplished by piling it in heaps, with alternate layers of fuel, on the ground; or in furnaces made for the purpose, and setting a light to the heap on the side next the wind, and when it has burned out and become cold, it is ready to be removed to the smelting furnace.

Mr. Teague proposes to economize the fuel used in the manufacture of iron by the employment of the waste heat, or that which escapes out at the chimney top of a smelting furnace, in roasting the ore mineral or mine. And for this purpose he employs an arrangement of furnaces, similar to that represented by figs. 5 and 6, Plate II. where *s s* shews the flue from a smelting furnace of the usual construction, susceptible of being closed at pleasure by the damper *s*, fig. 6; when the flame or heat branches out into, and through the four chambers *p*, shewn in plan in fig. 5, one of which is in section in fig. 6. The bottoms of the chambers *p*, are furnished with inclined plates, on which is placed the ore to be roasted, as exhibited in fig. 6; and there is a furnace door to each of the chambers, through which the ore is to be introduced. During the filling of the furnaces, or while the fire in the smelting furnace is getting up, the flue *s* must be kept open, that the draft may pass directly through it; but when all the chambers are charged, and the smelting furnace in full operation, the damper in *s* is to be closed, and the flame consequently directed through the ore in the chambers *p*.

There are unquestionably many situations in which the plan here proposed might be adopted in the manufacture of iron with considerable advantage, The facility of deriving the roasted ore from the inclined plates *p*, into the smelting furnace before it loses its heat, evidently constitutes an important feature in this invention.

Flooring-boards.—To M. Muir, of Hutchinson Town, Glasgow, Scotland, Engineer, a patent for "improvements in machinery for preparing boards for flooring, and other purposes," was granted on the 22nd of December, 1831, and the specification was enrolled in the Rolls Chapel Office on the 28th of April, 1832.

In the 3rd volume of the present series of the "*Register*," page 65, we have described a machine, by this patentee, for per-

forming at once the several operations of sawing, planing, grooving, and tonguing flooring boards, and his present patent is for an addition to the same, by which the boards are reduced to an uniform thickness, and therefore completed for laying on the joists. For this purpose the boards are laid upon their faces, or planed sides, and made to pass under a set of revolving adze cutters, by which they are reduced to uniform thickness. On Pl. XI. fig. 4, we have given a sketch of the revolving adzes, where *a a a* show a cast-iron frame; with a pulley or rigger, for giving motion to the cutters *b b*, which are connected with a horizontal axis by means of the rectangular arms *c c*; *e e* are adjusting screws, to regulate the depth of cut; and *f f* are binding screws, for securing the cutters when adjusted. *g g* show a band by which the motion of the steam engine or other first mover is transmitted to the revolving cutters. *h h* show the board to be acted upon, and *i i* are two rollers resting upon the board, and by means of the weight *k*, the lever *l* and the bent frame *m m*, prevents the board from rising while under the operation of the cutters.

The boards are brought forward to the cutters by means of chain passing over a drum situated where the frame is shown imperfect. From different links of the chain descend hooks, which hold the end of the board and force it forward as the drum revolves, and when the last end of the board is brought under the drum it is to be pushed forwards by the introduction of another board, and a hook from the chain applied to the farther end of that, and so on in succession, during the operation of the machine.

The favourable opinion which we formerly gave of Mr. Muir's planing machine has been completely born out by the success of the machine, and we have every reason for believing, that the patent before us will prove an important addition to his former invention.

ON DRAKE'S PATENT PROCESS IN TANNING HIDES, AND BROWN'S PATENT GAS-VACUUM ENGINE.

Sir,—In your number for this month, (May), I find you give the particulars of a patent obtained by William Drake, of Bedminster, for an improvement in tanning hides and skins, and finding too, that you seem to entertain a favourable opinion of the same, I have taken the liberty of informing you what has occurred to my notice. In 1825, I was employed by Messrs. Spilsbury and Budnall, (who I believe had obtained a patent for effecting the same object as that proposed by Mr. Drake, viz. that of tanning hides by forcing the tanning matter into them, instead of waiting for them to absorb it), an engineer, to make the force pumps and other apparatus for forcing

the tanning liquid into the hides, instead of their being tanned in pits. Several hides certainly were afterwards tanned in a very short time, but it was found that a great portion of the gelatinous matter was driven out of the hide; the leather consequently lost weight, was more porous. and not so elastic or durable as when tanned in the ordinary manner: in short, it was a complete failure. Not seeing any material advantage or difference in Mr. Drake's propositions, I thought it might be worth your while to be acquainted with the fore-named facts. (See remarks by Editor on foregoing at foot)

By the way, I have heard but very little of Brown's gas vacuum engine of late; however, from the enclosed which I send you, I find there is a great chance of his applying it to a certain extent, viz. for draining of land, lifting water in great quantities to small heights, &c.‖

Your's, respectfully,

W. M.

May 30*th*, 1832. A Subscriber to the Register.

[We agree so far with our correspondent, that there is considerable similarity in the *principle* of the two rival processes patented by Messrs Spilsbury and Drake; we differ from him, however, in opinion that no material advantage will arise from Mr. Drake's *mode of operating* Upon referring to Mr. Spilsbury's patent, (given at page 201, vol. iii. of our first series), we find that he commences his patent with this declaration :—" My improved method of tanning skins or hides, consists in the application of *mechanical force* by means of certain machines or apparatus, for the purpose of driving the tan liquor or liquors through the skins or hides intended to be tanned." The nature of that mechanical force is afterwards explained to be hydrostatic, which is to be communicated by means of vertical pipes, leading from cisterns of tanning liquor above, varying in their altitude according to the nature of the skins and other circumstances. No mention is made of the application of force pumps in our account of the patent, and they were probably subsequently adopted by the patentee for mere convenience. In either case, however, it is evident, that the application of considerable mechanical force was contemplated. It is probable that Mr. Spilbury's method of forcibly driving the tanning liquor through the hide, may rupture some of the delicate membraneous vessels, and thus injure the flexibility of the leather. But as Mr. Drake uses much less force, his leather cannot be injured in the same degree as Mr. Spilbury's; and we therefore think that the expedition in tanning said to be obtained by Mr. Drake's process, must be owing to the evaporation constantly induced on one of the sides of the skins, which takes away only the aqueous portion of the vegetable solution, leaving the tan deposited in the cells of the skins; and this constant abstraction of the water from the cellular vessels, allows more tan liquor continually to flow into them, until they

‖ We thank W. M. for the papers respecting Brown's engine, and have annexed as much of the substance of them as we think will interest our readers. It affords us individually much satisfaction to learn that Mr. Brown will eventually be compensated for his ingenious and persevering labours.

become filled with the vegetable matter; no more water will then pass through, and the skin is said to be tanned. Now this operation is uniform and gentle, and viewing the matter theoretically, we should say has not the same tendency as Mr. Spilbury's to destroy that elasticity of fibre upon which good leather depends.

Since writing the foregoing, we have seen a gentleman well acquainted with the subject, who informed us, that however little the pressure may be, the gelatine will be pressed out, and consequently that good leather cannot be produced by the process even of Mr. Drake.

PATENT GAS VACUUM ENGINE.

EMPLOYED IN SUPPLYING THE UPPER LEVEL OF THE CROYDON CANAL.

It appears from the papers obligingly transmitted to us by the gentleman whose letter precedes this account, that Mr. Brown has succeeded in beneficially applying his very beautiful invention on the banks of the Croydon Canal, for supplying the upper level with the water from the lower; and that it has been in operation above eighteen months. The cylinder is 22 feet high, and 3 feet 6 inches in diameter. The power obtained is estimated by Mr. George Rennie at 6 horses, as stated in a certificate from that gentleman, who observes therein, that he has no doubt, from the simplicity of its construction, and the moderate charge at which it can be erected, with the advantage it posseses of being ready for immediate action when wanted, it is rendered a valuable and profitable machine for raising water, or draining lands, and particularly in situations where the accumulation of water is uncertain, "and where there is a ready sale for coke." The committee of the Croydon Canal Company have likewise certified, by letter to Mr. Brown, that the abovementioned engine, which we shall now proceed to describe, "performs its work much to their satisfaction."

a, fig. 1, Pl. XII. represents a cylinder, 22 feet high and 3 feet 6 inches diameter, standing in the lower level of the Croydon Canal. To set it to work, water is turned by the cock *b* on the wheel *c c*. This wheel regulates the motions and the number of strokes per minute, opens the valve *d*, and admits a certain quantity of gas into the cylinder, which is immediately afterwards inflamed by a jet of lighted gas *e*, and expels the air from the cylinder, by raising the lid *f*, which instantly shuts, when an injection of cold water, by the perforated tube *g*, fed by the outer pipe *h*, cools the cylinder and effects the vacuum. The water than rises in the cylinder, 7 feet above the discharge valve *i*; the atmospheric valve being next opened, the water rushes out of the discharge valve *i*, and through the shoot *l* into the canal: this operation completes the stroke. The height to which the water ascends in the cylinder is indicated by a glass tube *m*.

The quantity of work done by this engine is thus certified by Mr. George Manwaring and Mr. James Burton, Engineers of London.

"Sir, *Lambeth, December 12th*, 1831.

"We the undersigned have witnessed a trial of your gas vacuum engine, situated on the Croydon Canal, and from the several experiments made the results are as follows: on Friday morning the 3rd of June, at 7 o'Clock, the gas holder being full, the oven and retorts charged, the engine commenced working, and continued doing so for the space of 3 hours—at the expiration of which we found the water raised in the upper level of the Croydon Canal two inches, which is an average supply for two days for the general purposes of the Canal; the length of the above level, including the basin, is one mile, at an average breadth of thirteen yards."

To S. Brown, Esq.
Eagle Lodge, Old Brompton.

How far the data furnished by the foregoing statement will conform to the estimate made by Mr. George Rennie, we will now proceed to examine:—

36 × 36 = 1296 inches, in a superficial yard, × 13 yards = 16,848 × 1760 yards (in a mile) = 29,652,480 inches × 2 inches (depth) = 59,304,960 cubic inches, which, ÷ 282 = 210,301 gallons × 10 lbs. = 2,103,010 lbs. raised 17 feet 6 inches high in three hours; therefore 2,103,010 lbs. × 17 ft. 6 in. = 36,802,675 lbs. raised 1 foot high, which ÷ 180 minutes = 204,459 lbs. raised 1 foot high per minute, which ÷ 28,000 (the usual allowance for a horse's power in *pumping*) gives the power exerted by the gas engine at 8 horses and a small fraction (viz. $\frac{454}{28000}$). This is 2 horses more than Mr. Rennie's estimate, who is nevertheless probably correct, as there must be great difficulty in ascertaining the precise altitude of water having a mile of surface exposed to the atmosphere. We should like to know the quantity of coals consumed per hour in producing the gas, and the quantity of the latter used in the engine.—Ed.

HYDROGEN GENERATING APPARATUS.

TO THE EDITOR OF THE REGISTER OF ARTS.

Sir—Having frequently experienced inconvenience for the want of a ready means of obtaining a supply of pure hydrogen gas for chemical purposes, I designed and constructed an apparatus by which I can at any instant obtain any quantity of gas less than three gallons, and I have found this apparatus so convenient, that I have deemed it worth while to make its construction known to the public through your useful Journal; feeling convinced that when its construction and application become generally known, no laboratory, whether on a large or small scale, will be without a hydrogen generating apparatus on the principle of the one I have sketched in the

accompanying drawing (see Pl. XI.), where *a a* shews an exterior vessel, which may be a cask holding eighteen gallons, or any quantity of fluid. The cask or vessel is to have a hole about half an inch in diameter, about three or four inches from the bottom, to be stopped by a plug; *b* shews the receiver or inner vessel, about eight inches smaller in diameter than the outer vessel; made of earthenware, glazed inside and out, and of the shape of a bee-hive. In the upper part or centre of the dome a circular opening is to be drilled about half an inch in diameter, to receive a piece of pewter gas-pipe *c*, about four inches long; one end of this pipe is to have soldered to it a female screw of brass to receive a stop-cock *d*; the other end is to have holes exactly opposite to each other, drilled through the pipes, to receive a triangle or ring of lead *e*. When this tube is prepared, it is to be secured in the opening in the dome by plaster of Paris, and when perfectly dry, the triangle or ring of lead is to be secured to it by passing the end of the slip of lead through the holes, bringing the ends together, and twisting them; a support is thus made for receiving a slip of lead, about half an inch wide, which is to hang in the centre of the vessel, to receive a coil of sheet zinc F, which is to hang within two or three inches of the bottom of the vessel. The receiver is then to be screwed in its place, by having the top of the cask screwed down upon it; this may be done by making a circular opening in the centre, for the stop cock to pass through, and a second opening in the side, for pouring the acid and water into the cask. When the apparatus is finished and ready for use, the stop cock in the receiver is to be opened, and water is to be run into the outer vessel until it and the receiver is full; when full, the stop cock is to be closed, and the plug in the lower part of the outer vessel is to be opened, so as to let all the water above it run off, the plug is then to be put in its place, and concentrated sulphuric acid is to be added, to be about one-eighth of the water used, so as to have one pint of acid and seven pints of water; after a short time, the acid will become mixed with part of the water, and coming into contact with the zinc, will generate the hydrogen in abundance, which rising to the upper part of the receiver, displaces the water, which is again received into the outer vessel; it is necessary that the plug in the outer vessel should be low down, so as to let off sufficient water to prevent the acid and water from running over the outer vessel when the receiver becomes full of gas.

When the hydrogen is wanted, nothing more is required than to screw on to the stop cock a bladder or silk bag, then turning the cock, the diluted acid will descend in the outer vessel, and displace the gas; the bladder or bag will be filled in a few seconds; immediately the stop cock is shut, hydrogen again is generated, which forces the diluted acid into the outer vessel. The operation continually goes on as long as any zinc or acid remains.

CHARLES BUTTON.

SAFETY APPARATUS FOR THE COMBUSTION OF THE MIXED GASES OXYGEN AND HYDROGEN.

INVENTED BY MR. HEMMING.

The above consists of a brass cylinder, with an ordinary jet piece attached. The interior of the cylinder, which is about six inches long, and three-quarters of an inch diameter, is filled with very fine brass wire, closely packed in lengths equal to the tube, and wedged more closely by a pointed brass rod forcibly driven in through the centre of the wires. The interstices between the wires thus form a series of very fine metallic tubes, the cooling and conducting power of which effectually prevents the recession of the flame. It may be used without apprehension on a bladder containing the mixed gases while held under the arm.

One of these tubes, three-quarters of an inch in diameter, has been ascertained to contain 4060 pieces of wire, besides the tapering rod, which at its thickest end is about the sixth of an inch. The inventor of this piece of apparatus has fully established its perfect safety by removing the jet and cap from the exterior end, and lighting the gas as it issued from between the wires.

ON THE QUADRATURE OF THE CIRCLE,

BY DR. THOMAS P. JONES, M.D.

Although the practicability of making a perpetual motion is a question settled in the negative by every man well versed in the principles of mechanics; and although those acquainted in the higher geometry, have given up the attempt to square the circle, or, in other words, to find a square the area of which shall be exactly equal to that of a circle whose diameter is given; we are yet not unfrequently amused, through the medium of the journals of the day, with the assurance, that what has eluded the researches of the most able engineers, and the most profound mathematicians, has been *luckily* discovered by some sciolist, without the use of the midnight lamp. In a former number of this Journal, we gave some account of the most prominent schemes of perpetual motion, and it is our design in the present article to notice the attempts which have been made to square the circle.

We have been directed to this subject by some recent publications in the papers of Washington city, in which a gentleman in one of the public offices, has triumphantly announced his most complete success in this difficult, if not impossible problem; and informs us that he has entrusted his secret to fifteen individuals, all of whom are perfectly satisfied of the correctness of his principles. We are not told how many out of the fifteen are capable of forming a judgment upon the subject, but we happen, however, to know that at least one of the number is unacquainted with the meaning of decimals; and we also know that those most capable of deciding the question are not, and

have no desire to be, of the number of the initiated. A few years ago a similar announcement was made in the Richmond papers; but when the plan was presented to the public, it proved to be one of those gross mechanical modes of approximation, which have been repeatedly proposed. A cube and a sphere were to be made, and their relative masses ascertained hydrostatically. An approximation as inferior to that which the mathematician has obtained, as matter is inferior to mind. Others have proposed to cut a square and a circle out of a plate of metal, or other substance, both equal in thickness, and then to weigh them, ignorant of the fact that neither the weight or dimensions of such articles is capable of being ascertained with a millionth part of the correctness with which the mathematician has squared the circle.

The subjoined account of what has been proposed, and done, upon this subject, is abstracted entirely from Montucla, as contained in his "Recreations in Mathematics," translated by Hutton.

Montucla divides those who have pursued this inquiry into two classes; the first, geometricians, who, aware of the difficulty or impossibility of the problem, have not been led away by illusions, but have confined themselves to the finding out the most exact methods of approximation. The other class, those who scarcely acquainted with the elements of geometry, and hardly knowing on what principle the problem depends, have twisted and turned the circle in every direction, and have laboured, like the unfortunate Ixion, eternally rolling the heavy burden, without bringing it any nearer to its place of destination. When one error is pointed out to them, they soon return with their propositions in a new, but equally contemptible form; and unhesitatingly contest the best established truths in the elements of geometry, appearing to believe themselves specially appointed by Heaven to reveal truths to mankind, the discovery of which is withheld from the learned, that it may be bestowed upon idiots.

In the time of Aristophanes, the question of the quadrature had already become celebrated, as in order to ridicule Meto, he introduces him on the stage, promising to square the circle.

We first find in the writings of Archimedes, the announcement of the truth, that the circle is equal to the rectangle of half the circumference by the radius. Still something more was necessary, namely, to determine the proportions between the circumference and the diameter; and although he was unable to accomplish this with mathematical precision, he showed that the diameter being 1, the the circumference would be more than $3\frac{10}{71}$, and less than $3\frac{10}{70}$, or $3\frac{1}{7}$.

Since that time, if great exactness be not required, in order to find the ratio of the diameter to the circumference, the proportion of 1 to $3\frac{1}{7}$, or of 7 to 22 is employed; that is to say, the diameter is tripled, and $\frac{1}{7}$ of it is added: this seventh is never neglected, but by the most ignorant workmen.

Among the modern geometricians, the first who made any addition to our knowledge on this subject was Peter Metius, of the Netherlands; whose name was mentioned in connexion with the

discovery of the telescope in our last number. He ascertained that the proportion between the diameter and the circumference of the circle was very nearly expressed by the terms as 113 to 355; the error being scarcely the ten-millionth part of the circumference.

The celebrated James Gregory of Scotland, undertook, in the year 1668, to demonstrate the absolute impossibility of the quadrature of the circle, and although his conclusions were not universally admitted, they have never been disproved. He gave several very ingenious methods for approaching nearer to the measure of the circle than had been previously done.

The numbers expressing the proportions between the diameter of a circle and its circumference were carried out by M. de Lagny, to 127 figures, or decimals; by which it was shown that if the diameter be represented by unity, followed by 127 ciphers, the 128 figures which he has given as representing the circumference, and which commences with 314, and terminates with 446, will be less than the circumference, whilst it will be greater if the last figure be increased by unity. If we suppose a circle, the diameter of which is *a thousand million times* greater than the distance of the sun from the earth, the error in the circumference would be *a thousand million of times* less than the thickness of a hair.

Euler has pointed out the method by which we may go still further, but there are few who would not pronounce the labour to be superfluous. The supposition, therefore, that there is in England a standing reward of £10,000, or of any other large amount, awaiting the discoverer of the quadrature, must be placed among the prevailing vulgar errors: for with all her liberality, Britain does not give such rewards for the discovery of that which would be of no practical utility whatever.

Among those who have miscarried in their attempts to solve this problem, or who have fallen into ridiculous errors respecting it, the following are noticed by Montucla.

The celebrated Joseph Scaliger, who had no great esteem for geometricians, desirous of shewing to them the superiority of a man of letters in solving, by way of amusement, what had so long puzzled them, attempted the quadrature of the circle, and seriously imagined that he had discovered it. The quantity which he gave was a little less than the inscribed dodecagon. It was therefore an easy task to refute him, which was done by several mathematicians. The only effect produced upon Scaliger was, to throw him into a violent passion, and induce him to pour forth a torrent of indecent abuse upon the geometricians, and to confirm him more than ever in the opinion than they were destitute of common sense.

The celebrated Danish astronomer, Longomontanus, pretended to prove that the diameter of a circle is to the circumference exactly as 100,000 is to 314,185. The famous Hobbes imagined also that he had discovered this long sought secret; and upon being refuted by Dr. Wallis, he published a work with a design to prove that the whole system of geometry was founded upon false reasoning.

A certain M. Liger pretended that he had found out the quadra-

ture of a circle, and commenced by demonstrating that the square root of 24 was the same as that of 25; and of 50 the same as that of 49. This he attempted, not by geometrical reasoning, which he set at nought, but by mechanical contrivances, aided by figures.

M. Clerget made the wonderful discovery that a circle is a polygon with a determinate number of sides, and he thence deduced the magnitude of the point where two unequal spheres touch each other. He demonstrated also the impossibility of the motion of the earth. The affinity of these questions with each other has never been perceived by any other philosopher.

M. Mathulon, a manufacturer of stuffs at Lyons, undertook to act as a geometrician and mechanist, and in support of his pretensions announced that he had discovered the quadrature of the circle, and the perpetual motion. He deposited 1000 crowns to be awarded to any person who should prove that he was in error. M. Nicole effectually did this, and the thousand crowns were awarded to him, and were presented by him to the general hospital at Lyons.

A similar offer of a sum nearly double the amount, was afterwards made by an individual more distinguished for the possession of money than of mathematical learning. His method was to divide a circle into four equal parts by perpendicular diameters, and then to turn these quadrants with their four right angles outwards, so as to form a square, which square he pretended was equal to a circle, although it was manifest that the parts could touch each other in points only, instead of in their whole extent. Three persons appeared as claimants for the reward, so ridiculously offered; but the tribunal at the Chatalet decided that a man's fortune ought not to suffer from the errors of his judgment, when those errors were not prejudicial to society. The author of this offer obtained a sentence from the Academy of Sciences, which was that he should study the elements of geometry; he, however, was still convinced that he had been treated with gross injustice, and that future ages would blush for that in which he lived. Although but few of the pretenders to this discovery cut a figure so completely ridiculous, it is nevertheless true that their propositions have all of them had their foundations in ignorance of geometry.

It may be acceptable to those unacquainted with geometry, to learn how a very close approximation may be made to the ratio between the circumference and the radius of a circle, which is in effect the same as discovering the quadrature. If a polygon of any number of circles be described within a circle, and another be circumscribed, both touching it, the two areas thus formed can be ascertained by mensuration, and the exact circumference of each figure may be readily ascertained. Now it is evident that the circumference of the circle must be greater than the one, and less than the other of these polygons. Wellebord Snell, a countryman of Métius, laboured assiduously on this subject; he calculated a series of polygons, up to 5,242,880 sides, so that when it is pretended that a proportion between the diameter and circumference of the circle, his table furnishes the mode of refuting the pretension.

There is an ingenious and simple mechanical mode of proving that the area of the circle is equal to the rectangle of one-half the circumference, by one half the diameter. Or, in other words, is equal to that of a right-angled parallelogram, two of whose sides are equal to one-half the circumference, and the other two to one-half the diameter. Suppose a circle to be taken, and radii to be drawn from its centre to its circumference, numerous, and at equal distances from each other; then let this circle be divided into two parts, each a semicircle; cut through the radial lines from the centre close to the circumference, and open each semicircle out, so that the semi-circumference of each part shall become a straight line, the points of one piece will fit exactly into the spaces of the other, and the rectangle in question will be formed.—*Journal Franklin Institution.*

TRANSACTIONS OF THE SOCIETY OF ARTS, &c.

Continued from page 160.

APPARATUS FOR HOLDING NEEDLE-WORK.

The *large silver medal* was voted to E. S. GRAEFF, Esq. Southampton Place, Euston Square. A poor woman, a tenant of this gentleman, had the misfortune to lose one of her hands, and was thereby disqualified for her usual occupation of needle-work. Mr. Graeff, compassionating the irksomeness of her situation, contrived for her a set of instruments, very simple, by means of which she is now able to perform all kinds of plain work with ease and despatch. The needle is held in the hand which yet remains, and therefore the instruments are intended only to retain the various kinds of work in positions as nearly as possible resembling those in which they are ordinarily held.—*Ibid.* p. 294.

SIPHON WELL.

The *large silver medal* was voted to Mr. J. GOODE, of Hereford, for a very clever application of the siphon to feeding a tank with water from a higher level, in proportion as the water already in the tank is pumped out.—*Ibid.* p. 104.

MINERS' LAMP.

The sum of *five pounds* was given to Mr. J. ROBERTS, for his improvements to miners' lamps.—[See description, *Register*, vol. v. N. S. p. 310.]

WELDING IRON AND STEEL.

An interesting and valuable paper on welding and working iron and steel by Mr. C. VARLEY, is given in the present volume of the Transactions, which together with his papers on the microscope, and microscopic objects, occupy a very considerable portion of the Society's works.—See pp. 250, 232, 423, 533.

DYES AND PIGMENTS.

The *large silver medal* was voted to H. Lister Maw, R.N. for pigments and other articles collected by him in South America, on the banks of the Maranon and its tributary rivers, and presented by him to the Society. The activity and liberality of this enterprising officer have put the Society in possession of several new articles, some of which have been examined, and others are still in a course of investigation. A very fine purplish red fecula, from the leaves of the *bignonia chica,* is perhaps the most promising as a pigment; but the Society have not yet succeeded in applying it to the uses of the dyer.—Trans. vol. xlviii. p. 38.

FOREIGN WOODS.

In the Society's volume, p. 199, is inserted a notice respecting a collection of woods made by Dr. Wallich, in Nipal and in the Burmese territory, which, with the consent of the Directors of the East India Company, were sent to the Society for examination. An alphabetical catalogue of this interesting collection will be found at p. 441, accompanied by notices of the uses to which the more important kinds are applied in their native country.

IMPROVED HANDLES FOR GRAVERS.

We noticed the above mentioned improvements at page 117, and at the earnest desire of a correspondent, who is a provincial artist, we now give a particular description of them from the above mentioned work.

At fig. 4. Pl. XII. is the graver, made of well-tempered steel, and of a gently curvilinear form, *d* is the point, and *c c* are a series of notches cut in the upper part of the lower end. Fig. 3 is a section of the handle, *a a* being a hollow in the under side of it for the reception of the graver, and *b* a steel pin, or tooth, projecting a little way, so as enter any one of the notches *c c*, fig. 4, whereby the length of the instrument is determined, and the graver is prevented from slipping back, whatever be the degree of force that the artist may think fit to employ. *e e*, fig. 2, are two steel ferrules, split lengthways below, by which they are converted into springs, and likewise afford an opening, into which the lower angle of the graver is received, as shewn in section, fig. 5, *c* being the ferrule and *d* the graver. Fig. 6 is a section through the lower ferrule and the handle, (the graver being removed), to shew the position of the tooth *b*. Thus by the joint action of the tooth and of the spring ferrules, the graver is held firm in the handle, and at the same time is capable of being instantly disengaged, merely by drawing off the ferrule.

The handle for the etching point is on the principle of the common port-crayon. *a*, fig. 7 and 10, the needle or etching point, made perfectly straight; *b* the handle, having a hole (see fig. 9;) bored in its axis to receive the etching point, to which hole it is then turned quite true. The end is afterwards sawn or cleft down a little lower than the etching point reaches. (See fig. 8.) Over this part is slid

a taper ferrule *c*, turned quite true, and accurately fitting the handle; it is roughened by fine millings, so as to afford a firm hold to the fingers and thumb, and thus allow of its being slid backwards and forwards, in order to fix or loosen the etching point.

Testimonials of the importance of Mr. Donaldson's invention have been received from numerous eminent engravers—The subscribers to those documents remarking that the graver handles, from their peculiar construction, are thrown higher up in the hand, by which means a better hold of them is obtained; and by the peculiar application of the open ferrule, may be lengthened or shortened at pleasure, which, in many instances, will be found a great advantage; while the notches formed in the engraver being combined with a fixed pin in the handle, gives them a degree of firmness well-suited for etching deep or broad lines. The handles for its etching points are so constructed as to keep axis of the point and the axis of the handle in the same right line, in a greater degree of perfection than any other handle now in use; and the manner in which the ferrule is applied will ensure the firmness of the pivot in the handle, and this in dry point work is found invaluable. The capability they afford likewise of shortening or lengthening is a great convenience.

SWING HONE.

The *thanks* of the Society were voted to Mr. J. FAYRER, of 40, White Lion Street, Pentonville, for a swing-hone, for sharpening razors, and other articles of cutlery.

The exquisite edge given by the cutler to razors, lancets, and other fine-cutting instruments, can rarely be produced by those persons who are in the habit of using them. This arises partly from ignorance of the properties in which consists the difference between a good and a bad hone, and partly from want of that skill and slight of hand in the use of a hone, which long and constant practice only can give in perfection. Mr. Fayrer's hone is a plate of brass *a*, about an inch wide, and of any convenient length, ground to a perfectly smooth surface on both sides, one of which is marked R and the other S; part of each end is cut or filed away, leaving only two pins or pivots, on which the hone turns or swings. In the frame *c c*, (fig. 11, Pl. XII.) are two uprights *d d*, with notches to receive the pivots; *e e* are two boxes, one to hold a coarser, and the other a finer powder, made of oil*-stone ground down, and washed over: for the latter, finely powdered water-of-Ayr-stone may be conveniently substituted.

To use the hone, first place the side marked R uppermost, and put on it a few drops of oil and a little of the rougher or coarser powder, then draw along it, in the usual manner, the edge of the razor or other tool to be sharpened. As the hone swings on two pivots, the surface necessarily applies itself quite evenly along the edge of the blade, in whatever direction the pressure of the hand is made that holds the tool; and the particles of powder as the opera-

* Query. If Turkey-stone is meant?

tion proceeds, are continually becoming smaller and smaller, and and therefore giving a finer and finer edge to the tool or blade. To finish the setting, turn uppermost the surface of the hone, marked s, apply to it oil and the finer powder, and proceed as before.

Metal plates, both of steel and of tin, have already been made to serve the purpose of hones; but the application of brass as a material for this purpose seems to be new, as well as the contrivance of hanging it on pivots, in order to accommodate itself to the varying pressure of the hand.

AMERICAN PATENTS.

For an improvement in the apparatus for applying either simple or medicated steam to the human body. Boyd Reilly, *Cincinnati, Hamilton county, Ohio, February 5.*

This, as will be seen by the title, is a steam doctor's apparatus. The culprit—patient we mean—is to be laid upon a couch made for the purpose, and is to be covered over with a frame made of hoop iron, covered with cloth, &c. so as to have the form of a waggon top. The cloth is to be varnished, to render it steam tight, and is fitted perfectly to the frame of the couch. An opening is left at one end for the head of the subject, and the opening closed round his neck by means described in the specification. A tube from a metallic apparatus for heating the materials to be converted into vapour, opens into the cavity of the apparatus. The vapour of water, either simple or medicated, is sometimes to be used, but the favourite application appears to be sulphur.

The *familiar* tells us that "when sulphur is used it discolours the skin of the hands, until the scarf skin peels off. This may be prevented, if desired, by having coverings for them of the same material as that for the neck, the penetrating nature of the sulphur causes it to be painful to [parts of great delicacy,] they should be covered by a bag in like manner."

"Although I have made this application some hundreds of times, being a mechanic, I require the patient to take medical advice in cases of difficulty. In simple cutaneous or rheumatic cases, I pursue the following course. If the patient's skin is in a dry state, I generally cause perspiration in a few minutes by steam from half a pint of water;" "the water being removed, a full half ounce of roll brimstone is put into the empty vessel, which in this small apparatus takes as long to burn as the patient can conveniently remain in it." "In this recumbent position the patient seldom feels faint unless previously reduced, Should such symptoms appear, the sulphur may be removed to the baek of the fire-place, the usual applications being made to the patient, such as admission of fresh air, vinegar, cold water, &c."

It is useless to waste reasoning upon those who appear by thei acts, to consider ignorance and temerity as the best diploma which can be exhibited of the skill of a professor of the healing art; and whilst this class of patients is numerous, freebooters will be found in abundance, who, taking advantage of popular ignorance, are ready to sally forth, to "burn, sink, and destroy."

For an improvement in the Carpenter's Plane. PHINEHAS, MEIGS, MADISON, *New Haven county, Connecticut, February* 9.

THE objects to be attained by this invention are to cause a single iron to have the effect of a double iron; and to secure or detach it with greater facility than in the ordinary mode of fastening. The plane is, in fact, a double iron plane of a peculiar, and, undoubtedly, a new construction. The opening, forming the mouth of the plane, is mortised through in the usual manner, excepting at the ends, which are perfectly flat, as no wedge is to be used. A plate of iron is let in on each end of the mortise, extending from the top to the face of the plane, and secured in its place by grooves, into which its edges fall, and by a screw passing into the stock. A flat plate of iron, similar to the cap of the double iron, has a pin projecting from each side of it, at about three-fourths of an inch from its lower end; these pins pass into grooves prepared for the purpose on the side plates, and a joint is thus formed upon which this cap iron moves; the pins rest upon the bottoms or lower edges of the grooves, which keep the iron at a proper distance from the face of the plane. Near the upper end of this cap piece, there is a thumb screw, which serves instead of a wedge to fasten the cutting iron. The cutting iron is dropped into its place, between the cap iron and the stock: when there, the thumb screw is turned, and its point bearing on the cutting iron, throws the lower edge of the cap against that of the cutting iron, and fixes it in its place; the whole bearing being against the pins in the groove.

The claim is to the peculiarities described.

For machinery for making Bats for hat bodies. STEPHEN HURLBUT, *Glastenbury, Hartford county, Connecticut. February* 14.

THE wool is to be received from a common carding machine upon an endless apron, which apron receives a vibratory motion, that it may cross the wool as it delivers it upon the former. "The former is a light wheel, or table, having a horizontal rotary motion; and on the former is a roller; the roller is attached, by a swivel in its centre, to the apron on the former, and its outer or extreme end is secured to the frame of the carding machine, by means of a swivel and wire."

"The operation of the machine is as follows:—The web is received from the doffer of a common carding machine upon the

apron. It is carried by the apron to the former, and by the vibratory motion of the apron the web is crossed, as it is received between the former and the roller. The variation in thickness of the bat, for the formation of the body, must be regulated by the feed of the carding machine. The size of the bat for the formation of the body is regulated by a limb from the standard of the apron to which there is a crank pulley. When the bat is completed, it is torn from the circumference to the centre, gradually rolled over, and following the former through one of its revolutions, is taken off without stopping the machinery. The bat is then divided into three equal parts, which forms three hat bodies.

"My claim for a patent is to the whole of the foregoing description attached to the carding machine, and for crossing the webbing, and making the bat."

The drawing which accompanies this specification is a very imperfect one; and is not indeed worthy the name of a drawing, although it serves to give some general idea of the plan. The claim as it stands would seem to include the revolving apron; in this case it appears to be too broad.

For a mode of constructing the rotary steam engine, called the "Double Chamber Rotary Steam Engine." JOEL EASTMAN, *Bath, Grafton county, New Hampshire, February* 18.

THE patentee informs us that "the rotary or revolving part of this engine may be constructed in various ways, not essentially differing from other rotary engines; the distinctive character of my engine being the employment of two chambers upon the same shaft, by which the action upon the fixed heads is rendered equable."

The steam is admitted and discharged through openings in the fixed heads, and to them are attached the metallic stops which fill the chambers, and cause the steam to react upon the valve. Instead of the ordinary stuffing, it is proposed to close the juncture between the revolving cylinder and the fixed head, by driving wood, endwise of the grain, into a groove prepared to receive it, which being turned off, is to run against the metal.

The claim is to "the employment of two chambers on the same shaft, in which the heads that form the exterior ends of the chamber are fixed, or stationary, and by the use of which two chambers the force or action upon each end is equalized."

For a Water Wheel for Mills, in which the floats work upon hinges, or joints, and are enclosed within the rims of the wheel and a circular apron. JOEL EASTMAN, *Bath, Grafton county, New Hampshire, February* 18,

"THIS water wheel may be made of cast and wrought iron combined; its diameter may vary from two to six feet. The rim of the

wheel is to be partially surrounded by a circular case, or apron, which will confine the water within the rims, and between the buckets or floats. The floats are made to work upon joints, or hinges, and the water is conveyed on to the buckets, or floats, through a penstock, or close trunk, extending the whole height of the fall. The buckets, or floats, are to be opened and closed by apparatus appended to the wheel, to the frame, or to the plummer block on which it rests."

The junctures of the revolving parts are to be closed by strips of wood, driven into grooves, as in the foregoing article.

The claims are to the application of a water wheel constructed as above described; that is, with floats or buckets, which are opened and closed mechanically, independently of the action of the water, and the confining the water within the rims, by means of a case, or apron, whilst operating upon the floats, or buckets.

The motion of the buckets upon their hinges is effected in a manner similar to that of the valves in several rotary engines.

For an improvement in mortise door fastenings. LEONARD FOSTER, *Boston, Massachussets, February* 25.

THIS is to be a substitute for the common mortise lock; but it is to be so constructed as not to occupy more than half the width, or thickness, usually required for such locks; adapting it, therefore, to thinner doors, and weakening the door much less than ordinary.

The bolt is to be shot forward either by a turning or sliding knob, which projects through the escutcheons. The escutcheons are to be made of metal plates, three inches square, and as the body of the lock is but two inches, the screws by which these are fastened enter the solid parts of the door, above and below the lock. On the inside of the door there is a small bolt which enters the main bolt, and secures it in its place. When it is desired to have the door to lock on the outside, a small lock, like those used for drawers, is fixed under the bolt of the mortise lock, which has a notch in it to receive the bolt of the small lock. The advantage thus obtained is the carrying of a small key instead of a large one. To enable the bolt to spring back as the door closes, the plate on the door post is made to slope, the thickness of the bolt itself not being sufficient for that purpose.

The claims are to the construction and arrangement of the various parts of the door fastening.

For improvements in the printing press. AMOS SHERMAN, *city of New York, February* 26.

THE cheeks and cross timbers of this press resemble those in common use. The platten is worked by a toggle joint, and borne up by spiral springs in the manner of many of the modern presses. The handle, or lever, is fixed upon the middle of the near cheek, and when the platten is raised, its position is nearly vertical. The

pull is downwards, which the patentee says is the most advantageous way of working. There is a mortise made through the cheek, through which a rule joint passes, and upon this the lever acts, which operates upon the toggle joint.

The press is double, having a form, inking apparatus, frisket, and other appendages on each side of the platten. There is a rounce also on each side, as it is intended to employ two men to work the press, and two girls to attend to the sheets. The two parts are connected by iron bars, which can be removed, and the press worked as a single press, when desired. The claims are in the following words.

"First, I claim that part of the press as I have described it, forming a single combination; its main parts consisting of the bar handle, the two upright pieces, and the two horizontal pieces. I do not claim the bar handle, nor either of the four pieces abstractedly, but I claim the bar handle as used by me in its upright position, that position being the easiest for working. I claim the bar handle and near horizontal piece as united by me by the joint; regard being had to their relative situations and the purpose they serve. I claim the two upright pieces and farther horizontal piece, as they are moved by the near horizontal piece, and as the further horizontal piece is united to the near horizontal piece. I do not claim the toggle joint abstractedly, but I claim it as constructed and moved in the peculiar manner I have described it, with the horizontal piece between the two upright bars.

"Second, I claim the cylinder for winding up the blanket, not abstractedly, but for this purpose, and also for drawing out the frisket. I claim the roller with its bellying form, inserted in the cylinder, and the channel in which it revolves, and the union of the roller and cylinder for the purposes which they serve. I claim the blanket, not abstractedly, but as made in one piece, and placed as I have described it, held at one end by the rollers, and at the other by the lath. I claim the lath with its bellying edge, for the purpose of holding and straightening the blanket. I claim the guides of the lath for the purpose which they serve in being forced towards the platten by the frisket guides, and forcing the frisket guides from the platten. I claim the hooks on the corners of the bed, the guides on the corners of the frisket, and the ways containing channels in which the rollers run, as I have described them, and for the respective purposes which they answer in carrying in the frisket and blanket. I claim also the ways containing grooves in which the guides of the lath and frisket run for that purpose.

"Third, I claim the union of two beds in one press, pressed alternately by a single platten; and the union generally of the two halves of the press, for the purposes for which they are united. I claim the bar uniting the two beds, and the arrangement of the tail irons between the beds, to prevent the tail irons from interfering.

"Every other part of the press described above, except what I have thus claimed as my own invention, is not mine; but I declare the same to be old, and known before this my application."

For manufacturing Cast Iron Door Knockers, with brass plates.—INCREASE WILSON, *New London, New London county, Connecticut, March* 11.

THE specification is in the following words.

"The usual mode heretofore of manufacturing cast iron door knockers, with brass plates, has been to fasten on the brass plates after the knockers are cast, by means of solder, screws, or rivets. My improvement consists in casting the knockers directly on the brass plates, which may be done by first casting the inside of the brass plates with tin, lead, or other metals which fuse at a lower temperature than brass. The brass plates are then secured in their proper place in the moulds, and the iron poured in (as is usual in casting iron), which will readily unite to the brass plates, and secure them on more firmly, and better than is done in the usual way with rivets, &c.

"INCREASE WILSON."

For a machine for separating the Knots, Knobs, &c. from the Pulp used in Paper-making, before the sheet is formed; and also for graduating the quantity of pulp necessary to form the sheet. SOLOMON STIMPSON, *Newbury, Orange county, Vermont, March* 12.

THE machine for clearing the pulp, consists of a tub, which may be 2 feet in diameter; within this is placed a metal cylinder, or curb, which fits close to the bottom of the tub. This may be 20 inches in diameter, and 8 inches in width. Around the upper edge of it there are longitudinal openings to admit the pulp to pass through. The pulp is pumped up from the chest, and is admitted through a tube into the inside of the curb. Arms with dashers revolve within this curb, and drive the pulp against the openings where the finer parts pass through, whilst the knots are retained. A spout leading from the space between the curb and the tub, conducts the prepared pulp, to form the sheet. There is a cover to the whole to prevent the pulp from being dashed over.

To regulate the quantity of pulp which shall be supplied, the tube which conducts it into the curb, is in the form of a funnel; the pulp pumped into this keeps it filled, and any surplus runs over, and back again into the chest. A stop cock into the tube, between the funnel and its inner end, regulates the quantity which shall pass in.

For an improvement in the Boiler and Furnace for Steam Engines. SAMUEL FORBES, *city of New York, March* 17.

THIS consists of a furnace within a vertical boiler. A principal feature of the invention is the causing the bars that form the grate of the furnace to rise in a conical form, which greatly increases the surface by which the fuel is exposed to the action of the air. These

bars all meet in the centre of the furnace, rise there above the surface of the fuel, and are surmounted by a cap, perforated with holes, to admit atmospheric air to mingle with the combustible gases extricated from the fuel, and thus to perfect their ignition. The claim is in the following words.

"What I claim as my invention is the particular mode of constructing the fire-place with the grate rising conically, within a conical cavity. The cap piece for supplying air to the combustible gases. The mode of heating the fuel, and of supplying it to the furnace from the cylindrical chamber; and the general arrangement of the whole for the attainment of the ends proposed."

For an improvement in the Grist Mill. JOSEPH YEAMANS, *Ashtabula, Ashtabula county, Ohio, March* 18.

THIS is another portable mill, in which the upper stone is to be the runner, and to be about 18 inches in diameter. The principal, and we believe the only difference between this machine and some others, is the manner in which the stone is held down. This is effected by the form given to the foot of the spindle, which is turned so as to have a neck in it a little above its point or step. Two plates of metal, forming a collar, embrace this neck, and are screwed on to the bridge tree; the is consequently no loading necessary to the stone, as the bridge tree may be made to draw it down with any desired degree of force. There is no claim made.

For an improvement in the construction of Lamps; JOHN W. SCHULZE, *and* JOEL TRULL, *Medford, Middlesex county, Massachusetts, March* 19.

IT is intended by this invention to adapt the argand burner, to lamps of the ordinary construction. The interior as well as the exterior of the flame being supplied with air. The wick is divided into three or more parts, each having its appropriate tube. These tubes, *a*, fig. 8, Plate XI., &c. are segments of an ammulus, or ring, and when placed together assume a form resembling that containing the wick in the argand lamp. An opening is made in each tube for picking up the wicks, as in the common lamp. The air is admitted to the outside of the flame under the glass burner, it being elevated upon knobs for that purpose; and to the inside of the flame, through spaces, *b*, &c. between the tubes, they not being in contact with each other. The three separate flames are made to unite in one, by a conical ferule, or ring, placed just above the tubes; this inclines the flame inwards; the inner current of air is thrown upon the flame by means of a button. The apparatus is ingeniously contrived, and well described. We are somewhat apprehensive that the interior current may prove insufficient for perfect combustion, but suppose,

that on this score, the patentees have satisfied themselves by experiment.

The particular construction of such parts as appear to be new, are claimed, with the mode of combining them with those before known and used.

For an improvement in the Chandelier, or Hanging Lamps; William Lawrence, *Meriden, New Haven county, Connecticut, March* 23.

This hanging lamp has a reservoir, or chamber, in a form somewhat resembling that of the astral lamp now in such general use. This reservoir is composed of two shells, soldered at their lower edges, and allowing a space between their upper edges for flat tubes with wicks to pass out. It is proposed, sometimes, to cover the funnel shaped opening at the lower edge with a pane of glass, capable of being removed for cleaning; the glass is represented in the drawing by the straight line at bottom. (See fig. 7, P. XI.)

"By this improvement much of the light of the lamp will be reflected and concentrated from the inner surface of the globe glasses, and pass diverging by means of the opening through the body of the lamp, and thus prevent the shadow of that, and cause an equal diffusion of light; they are peculiarly adapted to work-shops, binacles, &c. and may be made of all sizes."

"I do not claim as my invention, the suspended lamp, the glass globed tubes, and the reflector in common use; nor the opening simply through the body of the lamp. But I do claim as my invention the means of making them altogether more useful than heretofore, viz. by the bell shaped opening in the well; the tubes for the wicks; the feeders; the bottom glass; and the mode of construction and suspension, as above described, and thereby its adaptation to produce the results specified above."

SLIDE OF ALPNACH.

For many centuries, the rugged flanks and the deep gorges of Mount Pilatus were covered with impenetrable forests. Lofty precipices encircled them on all sides. Even the daring hunters were scarcely able to reach them; and the inhabitants of the valley had never conceived the idea of disturbing them with the axe. These immense forests were therefore permitted to grow and to perish, without being of the least utility to man, till a foreigner, conducted into their wild recesses in the pursuit of the chamois, was struck with wonder at the sight, and directed the attention of several Swiss gentlemen to the extent and superiority of the timber. The most intelligent and skilful individuals, however, considered it quite impracticable to avail themselves of such inaccessible stores. It was not till November, 1816, that M. Rupp, and three Swiss gentlemen, entertaining more sanguine hopes, drew up a plan of a slide, founded

on trigonometrical measurements. Having purchased a certain extent of the forests from the Commune of Alpnach for six thousand crowns, they began the construction of the slide, and completed it in the spring of 1818.

The slide of Alpnach is formed entirely of about 25,000 large pine trees, deprived of their bark, and united together in a very ingenious manner without the aid of iron. It occupied about 160 workmen during 18 months, and cost nearly 100,000 francs, or 4,250*l.* It is about three leagues, or 44,000 English feet long, and terminates in the lake of Lucerne. It has the form of a trough, about six feet broad, and from three to six feet deep. Its bottom is formed of three trees, the middle one of which has a groove cut out in the direction of its length, for receiving small rills of water, which are conducted into it from various places, for the purpose of diminishing friction. The whole of the slide is sustained by about 2,000 supports; and in many places, it is attached in a very ingenious manner to the rugged precipices of granite.

The direction of the slide is sometimes straight, and sometimes zig-zag, with an inclination of from 10° to 18°. It is often carried along the sides of hills, and the flanks of precipitous rocks, and sometimes passes over their summits. Occasionally it goes under ground, and at other times it is conducted over the deep gorges by scaffolding 120 feet in height.

The boldness which characterizes this work, the sagacity displayed in all its arrangements, and the skill of the engineer, have excited the wonder of every person who has seen it. Before any step could be taken in its erection, it was necessary to cut several thousand trees to obtain a passage through the impenetrable thickets; and as the workmen advanced, men were posted at certain distances in order to point out the road for their return, and to discover in the gorges the places where the piles of wood had been established. M. Rupp was himself obliged, more than once, to be suspended by cords, in order to descend precipices many hundred feet high; and in the first months of the undertaking, he was attacked with a violent fever, which deprived him of the power of superintending his workmen. Nothing, however, could diminish his invincible perseverance. He was carried every day to the mountain in a barrow, to direct the labours of the workmen, which was absolutely necessary, as he had scarcely two good carpenters among them all; the rest having been hired by accident, without any of the knowledge which such an undertaking required. M. Rupp had also to contend against the prejudices of the peasantry. He was supposed to have communion with the devil; he was charged with heresy, and every obstacle was thrown in the way of an enterprise, which they regarded as absurd and impracticable. All these difficulties, however, were surmounted, and he had at last the satisfaction of observing the trees descend from the mountain with the rapidity of lightning. The larger pines, which were about a hundred feet long, and ten inches thick at their smaller extremity, ran through the space *of three leagues*, or nearly *nine miles, in two minutes and a half*; and during their descent, they

appeared to be only a few feet in length. The arrangements for this part of the operation were extremely simple. From the lower end of the slide to the upper end where the trees were introduced, workmen were posted at regular distances; as soon as every thing was ready, the workmen at the lower end of the slide cried out to the one above him, "*Sacher*," (let go.) The cry was repeated from one to the other, and reached the top of the slide in *three* minutes. The workman at the top of the slide then cried out to the one below him, "*Ill vient*," (it comes), and the tree was instantly launched down the slide, preceded by the cry which was repeated from post to post. As soon as the tree had reached the bottom, and plunged into the lake, the cry of *sacher* was repeated as before, and a new tree was launched in a similar manner. By these means a tree descended every five or six minutes, provided no accident happened to the slide, which sometimes took place, but which was instantly repaired when it did.

In order to shew the enormous force which the trees acquired from the great velocity of their descent, M. Rupp made arrangements for causing some of the trees to spring from the slide. They penetrated by their thickest extremities no less than from eighteen to twenty-four feet into the earth; and one of the trees having by accident struck against the other, it instantly cleft through its whole length, as if it had been struck by lightning.

After the trees had descended the slide, they were collected into rafts upon the lake, and conducted to Lucerne. From thence they descended the Reuss, then the Aar to near Brugy, afterwards to Waldshut by the Rhine, then to Basle, and even to the sea when it was necessary.

In order that none of the small wood might be lost, M. Rupp established in the forest large manufactories of charcoal. He erected magazines for preserving it when manufactured, and had made arrangements for the construction of barrels for the purpose of carrying it to the market. In winter, when the slide was covered with snow, the barrels were made to descend on a kind of sledge. The wood which was not fit for being carbonized, was heaped up and burnt, and the ashes packed up and carried away during the winter.

A few days before the author of the preceding account visited the slide, an inspector of the navy had come for the purpose of examining the quality of the timber. He declared that he had never seen any timber that was so strong, so fine, and of such a size; and he concluded an advantageous bargain for a thousand trees.

Such is a brief account of a work undertaken and executed by a single individual, and which has excited a very high degree of interest in every part of Europe. We regret to add, that this magnificent structure no longer exists, and that scarcely a trace of it is to be seen upon the flanks of Mount Pilatus. Political circumstances having taken away the principal source of the demand or timber; and no other market having been found, the operation of cutting and transporting the trees necessarily ceased.

Professor Playfair, who visited this singular slide, states that six minutes was the usual time occupied in the descent of a tree; but that in wet weather, it reached the lake in three minutes.—*Brewster's Journal.*

INSTITUTION OF CIVIL ENGINEERS.

A PAPER was read by the Secretary, on the 8th of May, communicated by Mr. Jenkins, giving a detail of numerous experiments on the strength of cast-iron beams of various forms and dimensions, made at the Horsely Iron Works, in Staffordshire.

'The prevention of the congelation of water in pipes,' was brought into discussion, and statements made of several methods which have been tried experimentally for this purpose; one of these consisted in enclosing one pipe within another, leaving an interstice of one inch which was filled up with pounded charcoal; the effect of this was only partial, as the water always froze when the temperature of the atmosphere came down to 20° of Fahrenheit: various other substances, such as common coal ashes, were found as effectual as the charcoal. It is worthy of remark, that the resistance to cold was greatest when the substances were put in loosely or very slightly compressed, agreeing with the observation, that a frost which penetrated only a few inches into loose garden mould and coal ashes, was known to have reached a depth of thirty inches in a hard gravel road.

ON THE MEANS OF GIVING A FINE EDGE TO RAZORS, LANCETS, AND OTHER CUTTING INSTRUMENTS.

By THOMAS ANDREW KNIGHT, Esq. F. R. S. President of the Horticultural Society, &c.

IN the preparation of steel, and in the art of subsequently forming it into cutting instruments, the British manufacturers are, I believe, unrivalled; and they have probably approximated, if they have not attained, to perfection; but in the art of giving the finest possible edge to their instruments, when formed, I think they have generally still something to learn; for I hear surgeons often complain that they rarely find themselves in possession of a well set instrument; and I have never yet, in any instance, seen a razor come from a cutler so set that I could use it with any degree of comfort; though I have obtained razors from many of the most eminent manufacturers of the metropolis. The machinery which they employ, has long appeared to me to be imperfect, and uncertain in its mode of operating, and in many respects inferior to that which I have been some years in the habit of using, and which I shall proceed to describe.

This consists of a cylindrical bar of cast-steel, three inches long without its handle, and about one-third of an inch in diameter. It is is rendered as smooth as it can readily be made with sand, or more properly, glass paper, applied longitudinally, and it is then made perfectly hard. Before it is used, it must be well cleaned, but not brightly polished, and its surface must be smeared over with a mixture of oil, and the charcoal of wheat straw, which necessarily contains much siliceous earth in a very finely divided state. I have sometimes used the charcoal of the leaves of the *elymus arenarius*, and other marsh grasses; and some of these may probably afford a more active and (for some purposes,) a better material; but upon this point I do not feel myself prepared to speak with decision. In setting a razor, it is my practice to bring its edge, (which must not have been previously rounded by the operation of a strop,) into contact with the surface of the bar, at a greater or less, but always at very acute angle, by raising the back of the razor more or less, proportionate to the strength which I want to give to the edge; and I move the razor in a succession of small circles, from heel to point, and back again, without any more pressure than the weight of the blade gives, till my object is attained. If the razors have been properly ground and prepared, a very fine edge will be given in a few seconds; and it may be renewed again, during a very long period, wholly by the same means. I have had the same razor, by way of experiment, in constant use during more than two years and a half, and no visible portion of its metal has, within that period, been worn away, though the edge has remained as fine as I conceive possible; and I have never, at any one time, spent a quarter of a minute in setting it. The excessive smoothness of the edge of razors thus set led me to fear that it would be indolent, comparatively with the serrated edge given by the strop; but this has not in any degree occurred, and, therefore, I conceive it to be of a kind admirably adapted for surgical purposes, particularly as any requisite degree of strength may be given with great precision. Before using a razor after it has been set, I simply clean it on the palm of my hand, and warm it by dipping it into warm water; but I think the instrument recommended operates best when the temperature of the blade has been previously raised by the aid of warm water.

A steel bar, of the cylindrical form above described, is, I think, much superior to that of a plane surface for giving a fine edge to a razor or penknife; but it is ill calculated to give a fine point to a lancet, and I therefore cause a plane surface to be made, a quarter of an inch wide, on one side of the bar, by cutting away a part of its substance; and I have found this form to be most extensively useful.

The edge of some razors, whether formed of wootz, of mixed metals, or of pure steel, but particularly of mixed metals, has generally appeared to me to be more keen and active when used a few seconds after it had been applied to the bar, than on the following day; and I have often seen the utmost activity restored to the edge of such instruments, so instantaneously, and by so apparently in-

adequate means, that I have been sometimes led to suspect the operation of the bar to have been something more than that of having worn away a minute portion of the metal; but I am not disposed to offer any conjectures respecting other effects which I may have conceived it to produce.

I have in many instances been able to give a very fine edge to razors in possession of my friends, which I could not set tolerably well by any of the ordinary means; and I have found that those composed of different materials could be set with equal facility, though the sensations they excited, when used, appeared to me to be in many instances dissimilar. The instruments upon which I have chiefly made experiments, have come from the manufactories of Mr. Pepys, Mr. Stoddart, and Mr. Kingsbury. The material which appeared to me to receive that which I shall call the most eager edge, (and it was very durable) was wootz, from the manufactory of Mr. Pepys; and that which received the smoothest edge, and which I thought best calculated for surgical purposes, was a mixture of rhodium and steel; the powers of the pure steel of Mr. Kingsbury, appeared to be intermediate; and my experience leads me to believe that under different circumstances, each of these materials might be used with some exclusive advantages.

The foregoing paper, which appeared in the journal of the Royal Institution, and was thence transferred to the Journal of the Franklin Institute, wherein the subject has been thus noticed by Mr. John Meer, of Philadelphia.

"I have had the same in contemplation for more than seven years; but through disappointment by the instrument maker, have never brought to perfection. You were acquainted with my first essays on the subject.

From subsequent experiments, I am fully satisfied that the instrument should be made, not to cut or abrade, but to give a fine edge to the razor by burnishing only; it therefore should be made of the finest cast steel, as hard, and polished as highly as possible; and in the using, it is only necessary to smear it over with a little sweet oil, as a medium to prevent the edge of the razor from coming into too close a contact with the burnisher, and so prevent abrasion. By this procedure I give my razor a highly polished, and an exquisitely smooth edge; and by thus burnishing the edge, it is made hard and durable. In other respects it should be used according to the directions of Mr. Knight. My burnisher (exclusive of its handle) is about four inches and a half long, of an oval figure, with one side flat, like the sectional drawing at fig. 12, Pl. XII., the advantages of which are, that the flat side may be used for a soft razor, the broad round side for a harder, and the narrow edges for the hardest; by thus proportioning the surface of the burnisher to the temper of the razor, you gain the best effect."

We can add our own testimony to the foregoing of the efficacy of the burnisher, as we frequently use one to restore the edge of pen knives after cutting plumbago pencils with them.

MISCELLANEOUS.

Manchester and Liverpool Railway.—It is stated in the *Liverpool Advertiser*, that on two recent occasions, "a load amounting to one hundred tons, was drawn by *one* engine from Liverpool to Manchester, a distance of above thirty miles, in an hour and a half; being at the average rate of *twenty* miles an hour. An eight horse waggon, on a common roaa, is capable of carrying only eight tons a day; consequently, it would take one hundred horses, working for the day on a turnpike road, to perform the same work as was here accomplished by a single steam engine in an hour and a half on the rail-road. It is said that no former performance effected on the rail-road has come near this result."

Leicester and Bagworth Railway.—On Wednesday afternoon, (June 13th), about 5 o'clock, two waggons, laden with about five tons of coal each, arrived at Leicester by the new railway from the pits at Bagworth, a distance of 11 miles. These coals were brought up in fulfilment of a contract that the railway should be made passable by a prescribed time. The two waggons were dispatched on that morning from Leicester with about nine tons of iron to complete the end of the line near the pits, and returned laden as above. The waggons are of the same construction as those employed between Liverpool and Manchester, with springs. It is expected the line of road will be finished in about six weeks for the regular conveyance of coal, which will reduce the price of this valuable article very considerably tn the county of Nottingham, as well as in those adjoining. —*Nottingham Review.*

Steel Suspension Bridge.—Over the Danube, near Vienna, a suspension bridge of steel has been lately erected by M. Ignace Von Mitis. The span is 234 feet English, and the versed sine 15 feet. A saving of one half in the total weight is calculated to have been effected by the employment of steel instead of iron; the strength also is much greater. All the steel used in this bridge was manufactured immediately from decarbonated cast-iron in Styria.

Canal from the Nile to the Red Sea.—According to the estimates made by some distinguished French engineers, the whole expense of a deep canal which should connect the Arabic gulf with the Nile and the Mediterranean, make Africa an island, and shorten the voyage from Marseilles to Bombay one-half, would not exceed £700,000; a sum considerably less than has been expended on some single works of the same kind in Great Britain.

We are obliged to postpone the List of New Patents until our next Number.

PATENTS ENROLLED BETWEEN 10TH JULY, AND 10TH AUGUST, 1832.

Particularizing the Offices in which the Specification may be inspected, with the Dates of Enrolment.

NEW ZEALAND FLAX.—To J. Holt the younger, of Whitby, in the county of York, Ropemaker, a patent "for the application of a mode or process for preparing and manufacturing certain fibrous substances," was granted on the 28th, and the specification was deposited in the Enrolment Office on the 18th of June, 1832.

In the manufacture of tarred cordage, the chief obstacle to the employment of that strong fibrous vegetable material, known by the term of New Zealand flax (but which also comes from Manilla, and other parts of the East), has been the apparent impossibility of making the fibres absorb, or unite with, the preservative fluid. In consequence, the chief use of the New Zealand flax has been confined to the preparation of white cordage. The patentee informs us in his specification, that he has discovered that the ultimate fibres of the flax are combined and inclosed by a coating of adhesive matter, which requires the application of some chemical solvent to set the fibres at liberty, and adapt them to the reception of tar; and the solvent which effects this object completely and economically, he finds to be a weak solution of potash or soda—his process is as follows.

The flax having been heckled and spun into yarn in the usual manner, is in a suitable state for the chemical procedure; which consists in immersing it in a solution of potash or soda, in the proportion of half an ounce of alkali to a gallon of water, which may be either hot or cold*. When the flax has been thus submitted to the action of the alkali for forty-eight hours, it is to be taken out, wrung, and hung up to dry, either in the air or in a stove. When dried, the flax will be found adapted to imbibe the tar as readily, and hold it as firmly, as the hemp in ordinary use; in performing which process, and all that may be subsequent, the rope manufacturer need make no variations from his accustomed proceedings.

There is likewise included in Mr. Holt's patent, some improved mechanical apparatus for depriving the New Zealand flax of the bark and skin with which it is found combined in the commercial state. A kind of grating, made either of iron or wood, is provided, consisting of a range of parallel bars, the whole forming a right-angled

* A solution of common soap answers the same purpose, but is not so economical in point of cost as the above.

parallelogram, having its two opposite longest sides inclosed by vertical boards. The bars in their transverse section are tapered, with their narrow ends or sides placed *upwards* in this frame; but another similar frame of bars which is made to fit and pass over the former, has its bars with the narrow ends or sides downwards, which arrangement gives the respective frames of bars a tendency to interlock in the same manner as toothed wheels; and, therefore, when the raw flax is spread upon the lower frame of parallel bars, and the upper frame, duly loaded, is laid over the flax, and passed backwards and forwards, a powerful and uniform rubbing action is produced upon the flax, which opens the fibres, while it separates the bark and other extraneous matter, which fall through the bars of the lower fixed frame, and is collected underneath.

For the convenience of supplying the flax to the lower frame, the latter is at the middle divided into two portions or flaps, which open like the lids of boxes, but meet together when down with serrated teeth; for the purpose (we suppose) of holding the flax in its place whilst being rubbed; but the specification is so obscurely worded in this part as to prevent our ascertaining the exact meaning of the inventor.

Ornamental Yarn.—To Pierrepoint Greaves, of Chorley, in the county of Lancaster, Gentleman, a patent "for a method or methods of making ornamental or fancy cotton yarns and threads, applicable to the making, sewing, or embroidering cotton and other fabrics," was granted on the 22d of December, 1831, and the specification was deposited in the Enrolment Office on the 21st of June, 1832.

This invention consists in dying cotton in the wool of various colours, and of every gradation of tint, and to mix the same up in various ways with bleached white cotton, so that by their union to produce a self or varied colour of yarn, thread or stuff, without such fabrics undergoing afterwards, as usual, the process of dyeing.

The patentee states his plan of operations to be, to dye separate portions of cotton wool of the seven primitive colours; and other portions of cotton wool of various shades or tints of the foregoing; and with these, together with white cotton, according to the taste of the operator, to prepare yarn.

Suppose, for instance, that the manufacturer required a peculiar green, he would take the primitive colours yellow and blue, and mix them together in such proportions as would produce the exact tint desired, adding yellow to lighten, or blue to deepen the colour; if an orange, yellow and red; if purple, blue and red, or pink; and by

varying the nature and proportions of the combination of the primitive colours of the cotton wool and their several shades, every possible variety of tint, and every gradation of shade, may be obtained with the utmost facility.

When the due proportions of coloured cotton are put together, it is to undergo the same processes as if it were in the white state, such as roving, spinning, twisting, winding, and doubling, to make it into yarn or thread, in which state it may be either used for sewing, embroidery, &c. or be woven into fabrics as in other yarns, and will not require any subsequent operation, such as dying, beside avoiding the bleaching process, which is always liable to deteriorate the colour, as well as the strength of the fabric.

MEDICINE.—To J. Strombom, of Old Broad Street, London, Merchant, a patent "for a medicinal composition, or embrocation, for the cure or prevention of external and internal complaints, and which may be beneficially used as an internal medicine," was granted on the 17th December, 1831, and the specification was deposited in the Enrolment Office on the 16th of June, 1832.

It does not appear that either the exertions of the "Schoolmaster abroad," or that of the "Schoolmaster at home," have yet tended much to check the daring proceedings of the quack doctors in filching the pockets and poisoning the bodies of the ignorant and overcredulous portions of the public. We have here a patent for a "medicinal composition," not like those made by the old nurse of great grand-mamma, consisting of some scores of simple herbs, of which a gallon or two might be taken with impunity, but a congregation of powerful stimulants and poisons, a very slight over-dose (amounting to only a few grains) of some of them would prove fatal.

The specification of the patent is extremely brief; we will therefore give the whole of it, as we can trust our memory for the entire substance, if not for the very words.

"To produce the said *embrocation,* take in SUITABLE QUANTITIES *spirits of wine, laudanum, oil of cloves, cajeputa oil, camphor, spirits of hartshorn,* and *spirits of turpentine*—mix these well together, and apply them to the part affected. This mixture being well rubbed in will give great ease, if not entirely remove the complaint. The same mixture is also to be employed internally in PROPER PROPORTIONS.

Neither the "suitable quantities," nor the "proper proportions," are given in the specification, notwithstanding the patentee is bound by the terms of his patent to "particularly describe and ascertain the nature of his said invention, and in *what manner the same*

is to be performed." Surely Mr. Poole, through whom this patent and specification was passed, ought to know that the above are the conditions of the grant. Perhaps, however, the patentee's knowledge of medicine does not extend to quantities and proportions, or he may imagine that they are of trifling importance, especially the doses when taken internally to "prevent complaints!"

The patentee's name will probably hereafter adorn the walls of the metropolis, unless he should take it in his head to commence experiments upon himself, which would more likely lead to his name being engraven on stone.

Fire Arms.—To Abraham Adolphe Moser, of Canterbury Row, Kennington Road, Surrey, Engineer, a patent "for improvements in certain descriptions of fire arms, communicated to him by a foreigner," was granted on the 15th of December, 1831, and the specification was deposited in the Enrolment Office, Chancery Lane, on the 15th of June, 1832.

The objects of the inventor are twofold, and the mechanical arrangements by which they are carried into effect form distinct claims under the patent.

Instead of igniting the powder which constitutes a charge, by producing inflammation exteriorly of the barrel, and thence communicating or conducting the flame through a narrow channel to the interior of the barrel, as in the customary mode of discharging fire arms, the patentee produces the inflammation wholly in the interior, so that the whole volume of flame shall at once act upon the powder, and produce a more certain and speedy explosion. For this purpose he fixes by glue a pellet of fulminating mercury in the middle of a disc made of card board, which latter, together with a piece of cloth, forms the usual wadding, and is of the full size of the barrel; the powder chamber at the end of the barrel is however of smaller diameter than the latter, for the intention we suppose of preventing an explosion by the too forcible compression of the mercury by the ram-rod. The powder chamber, which is a hollow cylinder of the proper capacity for a charge, has a central tube running nearly through it in the line of its axis, the pellet of fulminating mercury lying centrally in front of it within about a quarter or three eighths of an inch distance. This tube is a fixture, and forms the sheath of a metallic pin, one end of which, on pulling the trigger of the fire-arm, is forcibly projected by the reaction of a coiled spring, against the pellet of fulminating mercury and discharges the piece. The other end of this pin is screwed fast into a sliding tube, the screw serving also as a means of regulating the distance of the striking end

of the pin from the pellet of fulminating mercury; and to the sliding tube is connected another sliding piece moving parallel with it, having notches and other adaptations for the purpose of being acted upon by the usual levers and other mechanism, for cocking; the motions thus produced upon the levers having the effect of compressing the springs, that subsequently, by pulling the trigger, react and discharges the piece.

Considerable danger we think would arise in the use of this fire-arm, if there was either to be put into it a little excess of powder, or if too much force were employed in ramming down, causing an untimely explosion of the fulminating mercury.

The second object of the invention is for efficiently charging and discharging a musket or other fire arm without ramming down, thus dispensing with the use of the ram-rod, and enabling it to be employed with much greater expedition. To effect this, the charge is made of so much smaller diameter than the barrel, as to drop readily into its place, where it is retained until the piece is discharged by the lateral pressure of a pin which passes through a conical plug inserted in a solid part of the barrel; the pin being made to hold the charge in its place by a similar action to that of cocking a common gun; the external lever, which is operated upon by the fore-finger giving motion to another simple lever which pushes the holding pin into or against the cartridge.

Iron Manufacture.—To John Samuel Dawes, of Bromford, in the parish of West Bromwich, in the county of Stafford, Iron Master, a patent "for certain improvements in the manufacture of iron," was granted on the 22nd of December, 1831, and the specification was deposited in the Enrolment Office, on the 20th of June, 1832.

These improvements in the manufacture of iron are stated to be applicable to the processes of smelting, remelting, &c. and to consist in the introduction of certain materials at the bottom or lower part of the furnace or cupola, and in continuing such introduction during the above-mentioned operations of smelting, remelting, &c. in addition to the usual method of charging the said furnaces at or near the top or tunnel head; by which means the patentee considers that he is enabled to make a larger quantity of iron of superior quality, with a less quantity of fuel; and he adds, "*with less expensive materials than are commonly used, such as coal uncoaked, iron-stone untorrified*, &c."; by which we suppose he does not mean that others use these materials, but himself, although the contrary might be understood from the arrangement of the words. The specification, however, next proceeds to state, that the materials which he uses

consist of *charcoal*, or any other fuel applicable to the purpose, together with any of the well-known fluxes, such as alkalies, alkaline earth, lime, metallic, or other oxides. The introduction of the said fuel and other substances is effected through the medium of a conical tube or feeder, fitted to the top, and projecting a little behind the mouth of each blast-pipe, the blast pipes being in the usual situation. The said conical tubes or feeders, together with the said blast pipes, are said to communicate with the furnace through large water tuyeres, or, that they may be introduced at any other part of the lower end of the said furnaces, as shall be found best suited to the purpose.

As some of our readers may be dissatisfied with the quantity of information we have here given on this important subject, we beg to assure them it is all that is contained in the specification, to which we have no right to make any addition. We will, therefore, dismiss it with this remark, that the patenting ironmasters (with the exception of the scientific Mr. D. Mushet), have always been remarkable for short and unsatisfactory specifications. It is not our business to inquire into their motives, but their agents should not omit to inform them of the risk they incur with respect to their patent rights.

Pins, Nails, and Screws.—To Daniel Ledsam, Manufacturer, and William Jones, Screw Manufacturer, both of Birmingham, in the county of Warwick, a patent "for certain improvements in machinery for making pins, rivets, woodscrews, and nails," was granted on the 22d of December, 1831, and the specification was deposited in the Enrolment Office on the 22d of June, 1832.

The specification of this patent is descriptive of some very beautiful pieces of mechanism for the above-mentioned purposes.—It is illustrated by numerous well executed drawings, which exhibit every part with great clearness. There are three distinct machines; one for drawing out or straightening the wire, cutting off the proper lengths for small pins, and producing their rough heads; a second, for pointing and finishing the heads; and a third, for making larger pins, nails, moulds for screws, and rivets. As these several processes are produced solely by pressure, the machines are of great massiveness and strength; the latter, which stands in a space of about four feet square, will weigh as many tons.

In the first machine, motion is given to a drum on one end of the main horizontal axis, which carries at the other end a fly wheel; to this is connected externally a crank-pin (whose distance from the centre of motion is adjustable by an arrangement of slides and screws), and to the crank pin is attached a vibrating rod, to give

rectilineal motion to a lever, whose office it is to put in action a pair of plyers, which lay hold of the end of a piece of wire, and by the agency of subordinate mechanism, to draw through a hole in a square faced steel dye, called the "fixed cutter," a determined length of the wire (the length required being always precisely regulated by making a corresponding adjustment of the distance of the crank-pin from the centre of motion and the length of the vibrating-rod, &c). At the moment the wire has been drawn out to its assigned length, an inclined circular plane fixed to a plate on the main axis, presses laterally against a lever, which forces the plyers, containing between suitable dyes the length of wire in its gripe, past the square edge of the steel-faced fixed cutter, which being in close contact with the dyes in the plyers, cuts the wire off clean. The end of the wire thus cut, being now set against the plane or unperforated surface of the fixed cutter, a cam or wiper on the main axis pushes a slide through a fixed polished cylinder, the slide carrying before it a rod or bar, that forces up a coarse head upon the pin, by compressing a portion of the wire left beyond the chaps of the plyers and their dyes. To give the desired form to the head, the dyes are countersunk accordingly for the underside, and the extremity of the forcing rod is also countersunk suitably to form the upper side of the head. The dyes in the plyers and the forcing-rod (which latter may also be considered as a dye) are made separate, for the convenience of being changed when other formed heads are required to be made in the same machine. The several operations upon the wire, which we have been so long in describing, are performed in the machine in about half a second; and the fly-wheel, though moving rapidly, has only proceeded through a portion of one revolution, the remainder being employed in opening the chaps of the plyers and the dyes, to let the newly made pin drop out, and in causing the several parts brought last into action to retire to their previous situation; this being effected, the continued revolution of the wheel repeats and continues the operation already described: the fly-wheel making about eighty revolutions per minute, produces that number of pins in the time, or 4800 per hour. The pins thus produced are in an imperfect state, as they require pointing, and their heads finishing; to effect which, they may either be conducted as they fall by a shoot and hopper into another machine fixed underneath for the purpose, or be supplied by hand to such machine, which we will now describe.

Power is applied by a band and drum to a strong horizontal axis, which turns in plummer boxes fixed to opposite sides of a strong cast iron frame; this axis has mounted upon it an endless screw, which, by its revolution, gives motion to a toothed wheel, turning

on an axis above, at right angles to the lower. The upper axis carries a narrow solid cast iron wheel, the periphery of which is first turned to a true face and square (as respects a radial section), and then a groove is turned in suitable curves or lines to receive such portion of one side of the head as projects beyond the shank of the pin; a corresponding groove is made in a curved bar, forming a segment of a circle of about 60 degrees of the periphery of the wheel, against which it is held during the work by the elastic pressure of springs: so that when a pin is laid across the face of the wheel, with its head in that groove, the opposite side of the head enters the groove in the curved bar or pressing segment above, and thus, as the wheel turns round, the pressure of the fixed segment causes the pin to turn on its axis, and the head is continually pressed as it rolls round in the opposite grooves, which perfects and polishes it. As there would be great liability to the shank slipping during this operation, that portion of the breadth of the periphery of the wheel on which the shank of the pin is placed, is covered with a strip of buff or wash leather, and the opposing portion of the segment is similarly covered with leather, so that the shank is firmly held by elastic pressure, and enables the operation of pointing to be performed simultaneously with that of the head finishing. That portion of the pin which is to be tapered to form the point, projects beyond the periphery of the wheel, and against such portion is brought into action a small solid cutter, of a cylindric form (except that its longitudinal sides, instead of being rectilineal, have a slight concavity to fit the curve of the periphery of the large wheel). This cut terhas a spiral arrangement of file teeth, varying in their fineness, so that as the pin rolls on the periphery of the wheel, and traverses from one end to the other of the concave sides of the cutter, it is first coarsely cut, afterwards finely cut, and, lastly, nearly polished by the fineness of the file teeth: the operation being in principle somewhat analogous to the cutting of a good point to a black lead pencil, in which the knife makes a slight concave instead of a rectilineal cut. The file is put in motion by bands and pullies, communicated from a *small* pulley, which is actuated by the friction of the periphery of a fly-wheel of great diameter. The various adjustments and adaptations, according to circumstances and required changes in the work, are as complete in this machine as in the former. Want of space, however, obliges us to confine our illustrations to a diagram, explanatory of the mode of finishing the heads and making the points last described.

At *a a*, fig. 1, Pl. XIII. is given an edge view of the pin-wheel, *b* being the groove therein for the reception of the heads, and at *c*

is the strip of leather, enveloping about half the breadth of the periphery of the wheel; *d* shews an end section of the upper part of the pressing segment, having a groove underneath for the reception of the heads of the pins, also a strip of leather as before mentioned; the pin is represented between those opposing surfaces; *e* is the file-cutter, turning on its axis *f*. Now *d* being a fixture, and *a* turning round, the pin is thus made to roll, perfecting its head in the grooves, while the point also rolling round brings every part in contact with the cutter *e* throughout its length, and the latter turning with great velocity, points the pins as they are successively brought under its operation by the revolution of the wheel.

The third machine described in the specification for making larger pins, nails, or screw-moulds, is somewhat similar in principle and in many of its combinations, to the first; a powerful screw with quick threads, employed as the medium for communicating the necessary force for cutting off the wire, and some ingenious eccentrics or cams for producing irregular motion, being the chief variations.

Bedsteads.—To Robert Walter Wingfield, of Birmingham, in the county of Warwick, Brass Founder, a patent "for certain improvements in the construction of bedsteads," one or more of which said improvements is or are likewise applicable to other articles, was granted on the 22d of December, 1831, and the specification was deposited in the Enrolment Office on the 22d of June, 1832.

The bedsteads alluded to above are of the metallic kind, brass being apparently preferred; as the drawings represent them to be made chiefly of that alloy. The object is stated to be the prevention of fleas and bugs from domiciliarising therein. The principal parts of the framing of these bedsteads consist of tubes; and there is this peculiarity attending the posts, that instead of each of them being formed of two pieces as usual, screwed or otherwise fastened together where they meet the sacking-frame, they are made of one entire tube, but of two different diameters (being so drawn upon separate mandrils). The utility of this varying diameter will be obvious on explaining the construction of the bedsteads, which we will now do with reference to Pl. XIII. figs. 2 to 11. Fig. 2 represents a section of a piece of tube drawn of two diameters. Fig. 3, *a*, is a square boss, having a hole *b*, which is passed over the smaller diameter *c* of the tube (fig. 2), and fits close on the conical shoulder *d* of the enlarged portion *e*. The boss *s* has also cast to it two square plugs *f f*, with screw-holes to them, for the purpose of connecting them to the horizontal rails, which are described as "angle-

irons." At fig. 4 is given a view of a piece of tube, with the boss *a* upon it, and consequently a side view of the latter. Fig. 5 is a similar view to fig. 4, but with angle-irons *g g* screwed to the plugs *f f*.

Fig. 6 shows a plan of another boss, with dovetails *h h*, of which fig. 7 exhibits an elevation. If angle-irons be used to this, projecting dovetailed pieces must be fixed to the ends. In our sketches we have shewn, at fig. 8, a plan of a tube so adapted, having fixed to it a solid end plug and projecting dovetail, and a loose ornamental collar *i*, which becomes fixed on drawing the dovetails tight: an elevation of the same is given at fig. 9. The patentee likewise uses square holed bosses for square pillars, as seen at fig. 10, and varies the forms of the pillars as taste or fashion may direct, an example of which is given at fig. 11.

How far *brass* bedsteads may answer as a preventive of bugs we are not prepared to say, but we know that those reptiles, contrary to common opinion, make no objection to locating in *iron* bedsteads; and, as far as form of habitation is concerned, we think they would give a decided preference to the tubular architecture of the patentee, who should rather depend upon stopping up every cranny, than upon the virtue of his metal. It is due to Mr. Wingfield, however, to observe, that he has made, decidedly, the best metallic bedstead we have seen; the fastenings are simple, strong, and easily performed; and the manner of fixing the bed-frame to the posts is admirable, as the weight tends to make the connections firmer, while the bedstead may, at any time, be taken to pieces with unusual facility and dispatch.

FURNACES.—To Joel Benedict Nott, of Liverpool, Esq. a patent "for certain improvements in the construction of a furnace or furnaces for generating heat, and in the apparatus for the application of heat to various useful purposes," (being further improvements upon a patent obtained by the petitioner dated November 4, 1830), communicated to him by a certain foreigner residing abroad, was granted on the 22d of December, 1831, and the specification was deposited in the Enrolment Office on the 22d of June, 1832.

The several claims under this patent are for improvements in furnaces and their appendages, for which a former patent was obtained, as mentioned in the title. The first is described to be, for the construction of an air-chamber around the "chamber of combustion," which consists simply of making a double lining to the latter, with an interval between the two linings, such interval being open to the ash-chamber below, and, through the medium of a

grating above, also to the "chamber of combustion." The object and effect of this arrangement are said to be the prevention of clinkers forming and attaching themselves to the inner lining. As the air grating would, however, be liable to become choaked in such furnaces as were fed from above, Mr. Nott directs, that a sloping plate be fixed over the grate to shoot the fuel away from it.

The second improvement consists in making the oscillating support for the fuel in the vibratory grate of one solid (unperforated) piece of metal, instead of, as described in the former patent, the ashes from the ignited fuel being got rid of by falling laterally from the heap during the oscillations. This solid fuel-supporter may either be flat, a portion of a polygon, or the segment of a circle, but a preference is given to the latter.

The third improvement mentioned, is the introduction of a valve in the chimney-flue, for the purpose of promoting, at pleasure, a more rapid passage of air through the fuel, found to be especially useful in lighting the fire.

The fourth improvement is stated to relate to "the chamber of treatment," by which term the patentee does not appear to mean the *dining-room*, but an apparatus for the evaporation of fluids; for he says, that the vertical pipes or prisms, which lead from the lower to the upper chamber, are to be prolonged upwards, so as to extend above the water-line of the upper vessel, which will prevent the saline substances as they crystallize, from choking the said pipes or prisms. He also proposes the addition of a "tube of communication" from the lower to the upper vessel, which causes the whole crystallization to take place in the upper.

The fifth improvement consists in adding, laterally, to the last-mentioned contrivances, open vats or pans, with pipes communicating thereto, by which arrangement the crystallization of the salts is chiefly transferred to these vessels. Mention is also made of a tubular boiler in connection with the foregoing, but as no drawings are given in the specification, and the verbal account not the most clear and defined, we must content ourselves with this notice.

PAPER.—To John Dickenson, of Nash Mill, in the parish of Abbott's Langley, in the county of Hertford, Esq. a patent "for certain improvements in the manufacture of paper," was granted on the 10th of January, 1832, and the specification was deposited in the Enrolment Office on the 10th of July, 1832.

It is obviously a very important point in the manufacture of paper, to obtain a perfectly uniform and smooth pulp, that the article produced therefrom may be of a firm and even texture:

To attain this object in the most perfect and least objectionable manner, many contrivances have been patented in this country as well as others. Our readers will observe in the present number the specification of an American patent for the same purpose; and it is remarkable, that a somewhat similar mechanical arrangement has been devised both by the American inventor, and by our own talented countryman, Mr. Dickenson, (who, it must be acknowledged, has done more towards improving the quality of British papers, than any other individual), the superiority of whose mechanism in this instance, over that of his foreign cotemporary, is very apparent.

At fig. 13, Pl. XIII. is a diagram explanatory of this arrangement: *a a a* represents a section of a vat containing the pulp, which is to be regulated by a *waste:* at *b* is a false bottom: *c c* is a rotatory cylinder, through which that portion only of the pulp that is to be made into paper, passes; the knots, grit, &c. being prevented from entering by the wires which envelope the periphery of the cylinder. These wires are arranged spirally by a continuous coil, in the manner of a squirrel cage, but so close together as to leave only the one hundred and fifteenth part of an inch space between them. The wire recommended for this purpose is to be drawn of the figure represented at fig. 14, the narrow underneath side *d* being fixed next to the cylinder, where it is to be fastened by rivets to the longitudinal bars *e e;* leaving the uniform space between the coils as before mentioned, which may of course be easily performed by a guage. The spaces through which the pulp must pass are therefore longitudinal slits, two or three inches long, and only the 115th part of an inch wide. The ends of the cylinder are closed, except at the axes of rotation, which are formed of large tubes; through these the fine pulp received into the cylinder flows off to the mould on which the paper is formed. As there would be a continual liability of the fine insterstices of the cylinders becoming clogged, unless some means were adopted to prevent it, Mr. Dickenson employs what is *technically* termed a float (though it does not possess that precise character), which by an up and down motion agitates the liquid, and by changing the course of the current, or flow, through the wires, throws off whatever has accumulated on the outside of them. This float is a close vessel of strong copper, of nearly the length of the cylinder (four feet), and of the sectional figure seen at *f f;* an horizontal bar passes throughout the lower part of this vessel, and also through the tubular axes of the cylinder,

beyond the plummer boxes in which the latter turn, where the horizontal bar is fastened to a vertical bar *h* at each end, that are connected to a lever *i*, whose fulcrum is at *k*. At *l* is a double cam, put in motion by geer in connexion with the wheel that actuates the rotatory cylinder; every revolution of the cam lifts the lever *i* twice by means of the wipers *m m*, and through the medium of *h*, the copper float *f f* also about 1¼ inch each time, and the "float" being somewhat heavier than the fluid in which it is immersed, falls immediately afterwards, producing the required agitation.

A second improvement under this patent consists in the knives usually employed in the transverse cutting of the endless sheets of paper; these are usually two straight edged blades; one of which being fixed, and the proper length of paper drawn over it, the other descends and divides the sheet by a similar action to that of shears. In lieu of the upper moving knife with a straight edge, Mr. Dickenson employs one of an angular form represented at *n*, fig. 15, which is brought into contact with the lower fixed one shewn at *o*.

CARDING MACHINES.—To Hugh Bolton, of Sharples, of Bolton-le-Moors, Lancashire, Carder, a patent "for his improvements in machinery for carding cotton and other fibrous materials," was granted on the 5th of June, 1832, and the specification was deposited in the Enrolment Office, on the 9th of July, 1832.

The object of this invention is the taking up of the remaining seed, dirt, and other extraneous matter from cotton and other fibrous substances during the process of carding, by the application of a knife-edged blade to the carding machinery used, which takes off such extraneous matter from the carding cylinder, and delivers it into a receptacle provided for that purpose. In the specification complete drawings of a carding engine are given, in order to illustrate the application of this invention; but the diagram we have introduced at Pl. XIII. fig. 12, will be sufficient to render it intelligible to our readers.

The circular line at *a* is intended to represent the main cylinder, and that at *b* the doffing cylinder; between these is fixed by transverse bars the patent apparatus; *c* and *d* are two of the sides of the receptacle curved to the shape of the cylinder; *d* is a lid jointed to a cross rail *f*; screwed to the curved side *d* is the knife-blade *g*, its edge being bent so as to form a tangent to the

circle of the main cylinder, the distance from which is to be regulated according to the quality of the material under operation; and the patentee states as an example, that in operating upon the kind of cotton known by the term *Orleans*, he finds it best to fix the extreme edge of the blade at one sixteenth of an inch from the points of the wires of the cards.

The patentee states that the receptacle is to be covered up by the lid *e* during the process of carding, and that it is the duty of the *stripper* in going his rounds to open the lid, and remove whatever may be collected therein.

AMERICAN PATENTS.

[From the Journal of the Franklin Institute.]

Specification of a patent for an improvement in Lamps, by applying, in a new way, the principle of the Argand Lamp, to the common Wick Lamp. Granted to Lewis T. Gallup, *Woodstock, Windsor county, Vermont, March* 3, 1831.

The essential character of the invention consists in adapting the argand burner to lamps with imperforate bottoms.

To effect this, a cylindrical tube is constructed concentric with, and interior to, the wick, destined to convey the current of air through its centre; and this tube is furnished with a spiral groove upon its exterior surface, for the purpose of raising or depressing the wick, by a revolution of the tube which contains it, in precisely the same manner as the common argand lamp. The air tube, however, instead of terminating in an orifice at the bottom of the lamp, receives its current of air through a channel which opens beside the wick, at the top of the lamp.

The channel is furnished in either of the following methods. In the first the interior, or air tube, is to be inclosed in a second, which is concentric with it, and so much larger, that the intermediate space is sufficient for the reception of the wick and the moveable tube which contains it. This tube, as it is inclosed by a third, or exterior tube, may, for the convenience of description, be called the middle tube. The exterior tube is so much larger than the middle one, that the space between them is equal to, or greater than the capacity of the interior tube, so that the descending current of air, which passes through this space, furnishes a supply to the interior tube through which it ascends, as in the common argand lamp. The exterior tube is closed at the bottom, but descends far enough below the other to leave room for the current of air which passes around under the space between the middle and interior tube, and this space, which, as before remarked, contains the wick, is closed at the bottom by a

circular zone, so as to prevent all communication between the air passage and the oil that supplies the wick. To supply the wick with oil, one or more tubes pass across the air passage, opening upon the inside of the middle, and outside of the exterior tube, to which tubes they are fastened by solder.

According to the second plan proposed for admitting the atmosphere to the bottom, the air tube itself is constructed just as before, except that it is closed at the bottom. The descending current of air is thus furnished by one or more tubes, which pass down by the side of the wick from the top of the lamp, and enter the bottom of the tube, to which they are joined by solder.

In both these cases, the ascending current of air which supplies the exterior of the flame, passes through a circular row of perforations in the flanch which supports the chimney of the lamp as in the common argand burner, and an air-hole made through the lamp, or cylinder flanch, to let the air into the oil which surrounds the outer cylinder, or on the common argand principle.

LEWIS F. GALLUP.

A sectional sketch of this improvement is given at Pl. XIV. fig. 3. *a* representing the spiral tube interior to the wick. *b* space for the wick. *c*, space for air to pass to the interior tube. *d*, pipe for admitting air to the wick.

Specification of a patent for Locomotive Carriages, and Rail-roads adapted thereto. Granted to EMMOR KIMBER, *Kimberton, Chester county, Pennsylvania, March,* 5. 1831.

THE invention consists principally in employing the power of locomotive engines on acclivities, in such manner, that by diminishing the velocity of its carriage, the effective force of the engine will be increased in the same ratio—thereby superseding the necessity of stationary engines.

a a, figs. 1 & 2, Pl. XIV. are the common wheels of a locomotive carriage, (3 feet in diameter,) to which the power of the engine is applied, by a wrist or crank at *e e*. On these wheels the locomotive carriage runs upon a plane, drawing the train forward on the rails, nearly nine feet for every evolution. *i i* are two smaller wheels, (attached to *a a*, or separate,) 1 foot in diameter, and placed upon the same axle with *a a*. To ascend acclivities the locomotive carriages runs upon *i i*, upon their own rails *o o*, raising the common wheels clear from their rails,—and therefore the carriage with the train moves forward only *three* feet from every revolution.

The diameter of the wheels, being as three to one, the engine employs three times as much power in a given space on the smaller wheels, as on the common ones—but the carriage and train move forwards on the rails proportionably slower, and so of wheels of any other proportions, as four to one, five to one, &c.

On the middle of the fore axle is placed a cog wheel, *s*, of like diameter with the smaller wheels, to work free in the cog-rail *u*, to

prevent slipping on great ascents. This use of the cog wheel is known, and has been variously proposed and tried. The improvement consists in substituting one cog wheel and its rail in the centre, in the stead of mixed rails, and cog wheels on both sides of locomotive carriages.

w, on fig. 2, is a drag, or pall, that may be attached to locomotive carriages, and every car in their train to work upon the cog rail *u*. Its use is well known to prevent a slip or slide in cases of accidents on great acclivities, but it derives new importance from its connexion with the cog rail *u*, elevated in the middle of the road.

The ascending rails *o o*, and *u*, may be so constructed as to rest upon the foundations with the common rails, and be raised to their proper height by blocks: they are only used in ascending acclivities, and for the small wheels. The hind wheels of the locomotive carriage, and the wheels of all the cars in the train run on the common rails.

In this specification the wheels on the fore axle only are mentioned; because the power is considered as applied to the fore wheels. If the power should be applied to the hind wheels instead, or in part on both fore and hind, the principle would not thereby be changed. The small additional wheels on either, or on both, would be the application of power described and claimed as my invention.

EMMOR KIMBER.

For a Mould for making Scythe Sneaths. JOHN KNIGHT, *Woodbury, Gloucester county, New Jersey, April* 8.

A MOULD is to be made for the purpose of bending the timber into the desired curvature, and as the sneath is usually bent in two ways, the mould must be formed accordingly. This is to be effected by marking the intended curvature in one direction upon a piece of timber of sufficient thickness, which may then be sawed through in the line of the curve. Upon the edge of one of these pieces a furrow, or groove, is to be made, having the curvature in the other direction; the furrow must be of such size as to allow the sneath to pass into it. When these two pieces are put together, they form the mould. The timber worked straight, and to the proper size, is to be softened by steam, driven endwise into this mould, and allowed to remain until it has obtained its proper set.

There is no claim made; but as the bending by steam is a common process, and not, therefore, the subject for a patent, the particular manner of making the moulds must be the thing intended to be patented; this we believe to be new, and it may consequently be legitimately claimed.

For a Machine for making Horse Shoes. DAVID ANTHONY, JEREMIAH ADAMS, *Berkshire county, Massachusetts, April* 8.

THE horse shoe is to be formed by means of wheels, or rollers, of which there are to be four; they are to be made narrow upon their

faces. These rollers have axes, the gudgeons of which run in a strong iron frame, in the centre of which their faces meet, they stand opposite to each other, in pairs, so that a section through their axes would form a +. They are geared together by bevel wheels, and all turn simultaneously. Their edges are bevelled to bring them in contact, and their faces are so formed that a bar of iron passed between them will assume the shape required, and be countersunk, so that when bent round, the horse shoe will be in a nearly finished state. The wheels may be of such circumference as to form three shoes at one revolution. From these rollers the iron passes on to an apparatus for bending it round in the required curve. The claim is to "the machine for making horse shoes as above described."

We have no doubt that a machine of the foregoing kind, if made with great precision, will give to the iron the shape desired, but as regards the validity of the claim, the same circumstance which interferes with many *new inventions,* stands in the way of this; it unfortunately is old. A machine of this description was first brought into use in England, and was eventually imported into France. Of the period of its invention we are not informed, but in the *Recueil Industriel,* for December, 1828, published in Paris, a description and plate of this instrument may be found. It is there denominated "a machine which is to give to iron all the different forms required in the arts, by means of a continuous rotary motion," The French account remarks that by an engine of eight-horse power, operating upon a machine of the size designated, 3000 nails of an inch in length might be mannfactured in a minute; and that by its aid iron may be converted into any desired form in a very rapid and exact manner.

A comparison of the patent before us, and of the accompanying drawing, with the description and engraving in the above journal, will remove all doubt with regard to the perfect identity of the two machines.

The sketch at fig. 4, Pl. XIV. will afford some idea of the manner in which the wheels, or rollers, run together. Were their angular points taken off, a square bar might be formed by passing the metal between them; and other desired shapes, it is evident, might be produced, by indentations of the proper form.

For a Machine for Washing and Churning. JOHN WHITE, *South Union, Logan county, Kentucky, April* 12.

THE body of this machine is a tub in the form of a common pickling tub; that is, made larger at one end than at the other: slats of wood run from end to end on the inside, and the tub has gudgeons on the centre of each head by which it may be hung horizontally. There is a door for the admission of the articles to be operated upon.

When clothes are to be washed, the machine is to receive 20 or 30 turns in one direction, and then an equal number in the other,

and so on alternately. In consequence of the conical form of the tub, the revolution of the barrel causes the clothes to twist up; the reversed motion twists them in the contrary direction, and this alternate twisting is said to clean them thoroughly without injury. Its operation as a churn needs no explanation.

The claim is to "the so forming the tub, that in washing, the clothes shall be alternately twisted and untwisted, in the manner above described, with the slats contained therein; and also the application of a similar tub to the purpose of churning."

For a Smut Machine for cleaning grain. LEVI HAYWARD, *Phelps, Ontario county, New York, April* 12.

THE grain to be cleaned is dropped from a hopper into a hollow cylinder of sheet iron, standing horizontally, a large portion of the inside of this cylinder is set with spikes. A fan, with four wings, is made to revolve in this cylinder with a speed of seven hundred times in a minute; this is to throw the grain and smut against the spikes, which operation cleans the grain, and pulverizes the smut. From the cylinder the grain passes off into the eye of the stone, and in its passage the smut is blown from it by means of a fan wheel.

For a Machine for Breaking Stone for turnpiking and other purposes. BENJAMIN F. LODGE *and* EZEKIEL T. COX, *Zanesville, Muskingum county, Ohio, April* 12.

A CAST iron bed-piece is to be provided, upon which the stone to be broken is placed. This bed-piece may be about a foot in diameter, is to be concave on its upper surface, and perforated with holes for the broken stone to pass through. A ram or hammer is to slide between cheeks, or to be hung like a tilt hammer, for the purpose of breaking. The face of this hammer is to be furnished with projecting pieces, adapted to the holes, and suited to the concavity of the bed. Any of the known motive powers may be used to work the hammer.

"What we claim principally as new and useful, is the form of the bed, or block, and hammer; that is, the concavity of the one, and the convexity of the other; for we are aware that there has been an attempt made to introduce cast iron plates, or blocks, with holes for the purpose of breaking stone as above; but having a level surface, and being worked by a common sledge, or hand hammer, they have been abandoned as useless. The stone having a bearing upon the plate or block, directly under where the blow was applied, it resisted the force of the blow, and the blow produced little or no effect, and the pieces of stone broken off were liable to fly in any direction; whereas our machine,

having a concavity in the block, or bed, the stone has no bearing in the centre; and the hammer, of corresponding convexity, strikes first in the centre; the consequence is, that the stone is broken into a number of pieces the first blow, and the hammer being as wide as the bed, or block, prevents the stone from flying."

For a Machine for Jointing Staves for Barrels. George Eby, *Clarence, Erie county, New York, April* 15.

There are two jointers, each furnished with two plane irons, fixed by wedges in the ordinary way, but standing in opposite directions, so that they may joint a stave passing either backward or forward. These jointers are connected together by straps of iron united by pins, which pass through holes at a distance from the jointing part of the planes, equal to that of the semi-diameter of the barrel to be formed; the faces of the planes standing in the direction of radii from these pins as centres. By means of a treadle, the faces of the jointers are made to approach each other, and joint the two sides of a stave at the same time; giving the correct bevel to the edge, whatever may be the width of the stave.

The stave is attached by suitable fixtures to a jointing bar, which is made to pass backward and forward, carrying the stave between the jointers, and tilting it so as to bring it alternately in contact with the irons at each end, in order to give it the required taper.

The claim is to the manner of fixing and working the jointers; the jointing bar; working and tilting as described; and the general arrangement of the machinery for producing the intended effect.

Specification of a patent for an improvement in the method of Washing Rags for the manufacture of Paper. Granted to John Ames, *Springfield, Hampden county, Massachusetts, April* 6, 1831.

The improvement consists in dispensing with the washers, or screens now in use, and substituting in their stead a wire cloth cylinder, for carrying off the dirt and filth which may be beaten from the rags, or held in solution in the water, without the waste and delay of the old mode. The cylinder used by me is about twenty-two inches in length, and twenty-two inches in diameter, hollow, closed at one end, open at the other, surrounded by two coats or coverings of wire cloth, and revolves upon an axis. I construct the cylinder as follows:

The frame consists of metallic rods of suitable length, and sufficient in number to give strength and form to the cylinder,

running parallel with the axis, and supported by arms of the same metal. Over these rods is first stretched a coarse wire cloth, and then over that is stretched another wire cloth of finer texture; any reticulated material, however, will do for the inner covering, as its principal object and use is to support the outer one without opposing any considerable obstacle to the free passage of the water into the cylinder. The cylinder is left open at one end, but is entirely closed by a metal disc at the other. Thus constructed it is fixed in the washing vat, or engine, resting on arbours, with the open end adjusted to the side of the engine or vat, so closely as to prevent a waste of the stock, and placed at a convenient height to allow a free passage of the rags around the engine.

Within the circle described by the periphery of the open end of the cylinder upon the side of the engine, an orifice is made to let off the water which percolates into the cylinder. A band or gearing connected with other parts of the machinery communicates a rotary motion upon its axis to the cylinder, corresponding with the current, or roll of the stuff in the engine.

The benefit and utility of this improvement consist, 1st, in the saving of time in the preparing the rags for manufacture; 2nd, in dispensing with the washers now in use; 3d, in preventing a waste of stock, which in the ordinary mode of cleaning is very considerable. By my improved mode the dirty water is made to pass off more rapidly, and of course the clean water can be admitted more freely than when washers are used, through the apertures of which the pulp is driven by the force of the roll, or motion of the beaters, and so wasted, or clogs the washers by filling up the apertures, and prevents the passing off of the dirty water. By the rotary motion of the cylinder, by my mode, coinciding with the roll of the stuff, the water is freely received into the cylinder, and passes off.

The improvement which I claim especially as mine, is the process or method of washing, or cleaning rags, by adapting the wire cloth cylinder to the common washing engine divested of its washers, to effect the objects before mentioned.

The wire cloth cylinder I do not claim as my invention for which I now seek a patent, it having been before patented by me.

JOHN AMES.

At fig. 5, Pl. XIV. is a perspective sketch of the machine. *a*, the vat. *b*, the wire gauze covering to the cylinder. *c*, the open end of the cylinder running close to the vat. *d*, the opening through which water escapes.

Specification of a patent for an improved mode of manufacturing Spades nnd Shovels, by means of Machinery.—Granted to CHARLES RICHMOND *and* SAMUEL CASWELL, JR., *Taunton, Bristol County, Massachusetts, April* 7, 1831.

To all to whom it may concern, be it known that we, Charles Richmond and Samuel Caswell, Jr. have invented an improved mode of manufacturing spades and shovels by machinery; whereby much labour is saved, and the articles manufactured are made with greater truth and uniformity than by the modes hitherto pursued, and that the following is a full and exact description of our said invention.

The principal machinery which we employ is such as is well known to machinists; and to this, therefore, we make no claim, as we have merely so modified it, in size and form, as to adapt it to the purpose to which we apply it. That our mode of procedure may be perfectly understood, we have deposited in the Patent Office of the United States, drawings of the machinery, as modified and applied by us, and also a model of the same, corresponding with the drawings.

This machinery consists, first, of a cutting press, by which the plate prepared for making a spade, or a shovel, is cut out at one operation; and by another operation is punched, to receive the rivets necessary to attach the back strap and coffer to the plates.

The second part of the machinery is a stamping apparatus, usually called a drop. This has a bed-piece, or anvil, which is fixed below the sliding drop, and forms one part of the die by which the spade or shovel is to be shaped; the sliding part of the drop is made to correspond to this, and forms the upper part of the die.

To make a spade or shovel, we take a bar of Swedish or other iron, and upon the side of this we usually weld a piece of steel. The bar is then rolled out to the size necessary for forming the spade or shovel. It is then placed under the cutting press, and is cut out at one operation.

The same press receives dies to cut the strap, and also to punch the requisite holes, each of which is also effected at one operation.

The plates so cut are then placed in the drop, and by a single blow receive the form required.

The improvement which we have made in the manufacture of spades and shovels, and for which we claim a patent, is the use of cutters and dies, used in the cutting press and drop, by which the plate of which the spade or shovel is to be made, is first cut out, and afterwards stamped into the proper shape, each by a s ngle operation.

CHARLES RICHMOND.
SAMUEL CASWELL, JR.

Abstract of the specification of a patent for an improvement in the manner of constructing Ships and Vessels of every description, either for the purposes of War or Commerce.—Granted to Joseph R. Deming, *City of New York, April* 15, 1831.

The improvement consists in uniting together what may be called sundry horizontal frames of suitable timber, placing them one upon another in such a manner as to make the hull or external part of the ship or vessel *one solid wall of timber*, with the exception of the bolts and nuts of metal necessary to secure the said frames firmly together. The grain of the timber is of course as near as may be in the direction of the line of a figure forming a horizontal section of that portion of the ship or vessel to which it belongs. The frames above mentioned, and which I have spoken of as being horizontal, are not, however, of necessity of the same vertical sickness one with another; nor as regards any one frame is the vertical thickness thereof of necessity the same in its different parts. For as the vertical depth in all, or nearly all, ships or vessels, is greater at the head and stern than it is amidships, it follows of course, if a ship or vessel be wholly made of entire frames, piled upon and firmly secured to one another, that the vertical thickness of these frames will be greater at their extremities than in the middle.

In some instances it is proposed to interpose pieces of timber between one or more pairs of frames, particularly at the stern; the grain to run as nearly as may be in the direction of the length of the ship, and also of the curvature of the part in which it is placed.

Two methods of securing the deck beams are given. One by permitting their ends to extend through the sides of the ship, the beams having, if desired, a shoulder on the inside; they are then to be made fast to the hull by screw bolts, dagger-knees, hanger-knees, &c. The other mode is the making the frame in that particular part of the hull sufficiently thick to extend inwards and allow the deck beams to rest on them, and then securing them as above.

This mode of building dispenses altogether with plank, either on the inside or outside; and also with standing timbers, except it be a stern-post, and one or more short pieces underneath the cut water, to serve as a protection from injury to the part called the gripe.

The mode of building is to shape and lay down the keel much in the usual way. At each end of the upper surface, a piece of timber of proper size and shape, forming the *dead wood*, is attached by screw bolts. Pieces extending from one dead wood to the other are made fast to the keel by screw bolts; these are to be fitted to the dead wood, and to each other, by *butt joints*, *scarf joints*, or *hook scarf joints*. The bolts being so placed that

when the vessel is caulked no part of them will be exposed to the action of the water. These pieces when so fixed may be considered as constituting the first frame.

A second frame with dead wood pieces is then to be laid on the former, and secured by screw bolts long enough to reach through both frames. Pieces of canvass, dipped in white lead paint, or other suitable preservative matter, are to be laid between the timbers as they are bolted together, but this is not to be done to any greater height. The frames are to be laid successively in this way, recesses being made for the heads of the bolts, and the joints all having the canvass, &c. interposed. Tree nails may also be driven as the work proceeds, boring holes diagonally for this purpose. When built to the proper height, the deck beams are to be secured in their places by one or other of the modes above indicated.

When the vessel is completed, the seams are to be caulked, although from the manner of screw bolting together, it is nearly impossible that any leak can exist. The timbers are, of course, to be so arranged as to *break joints*.

The advantages proposed to be attained are, the using of less timber, and the obtaining of greater strength; to insure tightness even without caulking; to be able to work on the inside, even at sea, by a temporary removal of the cargo should a leak occur; to make iron bolts less liable to decay, by protecting them from contact with the water; greater security to persons and property; greater durability, and avoiding the recesses in which foul air is generated.

"I claim as new, the foregoing described method of constructing the hull of a ship or vessel, by uniting timbers piled upon and secured to one another in such a manner that the grain of each piece of wood shall, as near as may be, be in the direction of the part of the said ship or vessel to which it belongs, dispensing with the use of planking, except it be for the decks.

"I claim as new, the application of canvass and white lead, or other similar substance, laid in the seams between the timbers, so piled upon and secured to one another by the screw-bolts and tree-nails heretofore and herein described.

"I claim as new, the use of screw-bolts to fasten together the various series of frames of timber above described, in manner such that they may be wholly protected from coming in contact with the water.—And,

"I claim as new, the plan herein referred to, of constructthe *trunks*, as they are usually termed, made use of when centre boards are employed in ships or vessels; the advantage which this plan offers consisting in the trunk being made of a series of separate pieces of timber, piled upon and secured to each other by screw-bolts, &c. as above mentioned, but each piece being morticed through, to receive the centre board; thus making it practicable to render the trunk perfectly tight, a fact which now seldom or never happens." JOSEPH R. DEMING.

Specification of a patent for a machine for Cleaning Fur. Granted to William Woodworth *of the city of New York, April* 19, 1831.

This machine consists of a series of wheels, like water wheels, placed near each other in a horizontal frame covered in on the top, and bottom, and sides, the cover being as near the periphery of the wheels as may be consistent with their free motion, and lined with a cloth. A feeder is adjusted to one end, and at the same end of the series of wheels, a picker, which takes the fur as the feeder delivers it, and by the rotation of the wheels, with a certain rapidity, and alternately, in opposite directions, the fur is carried through the series, and as it passes on it is freed from the hair, which is attracted by the cloth lining, and adheres to it, so that the fur issues from the other end of the machine perfectly cleared from hair by a single operation, at which other end is placed a gauze bag or other receptacle in some convenient form to receive the fur as it issues. The wheels may be of the same or of different diameters, and of any convenient length; the beaters thereon constructed, like the buckets or paddles of water wheels, may be of any convenient number and dimensions. The wheels, supported on axes or gudgeons, working in boxes, set in the frame, may be of metal or other material. The frame made of wood, or other material, consists of two pieces which may be called cheeks; these are supported on a sufficient number of legs, or feet, according to the length of the cheeks, which must be long enough to hold the number of wheels to be used, be they more or less, or larger or smaller. These cheeks are framed together firmly by cross pieces and ties, in such a manner, and of such a length, that the wheels may freely revolve between them, the wheels to be placed at such distances as to revolve freely without touching each other, but as near as may be, consistently with this object. They must be covered in at the ends as well as above and below them—the cover should set close to the top and bottom of the wheels, coming to the sharp angles where the wheels are near each other, and these angles so formed as that the space between the edge of the angles and the wheels will be larger where the fur enters between the cover and the wheels respectively, than where it leaves them respectively. This is convenient, as it favours the passage of the fur from wheel to wheel. The cloth, it is believed, will best answer the purpose which has the coarsest and fullest nap. The attraction and adhesion of the hair to the cloth lining is ascribed to electricity therein produced by the motion of the wheels, and this power of attraction, it is contemplated by the inventor, may be increased in the cloth lining so as to make it electric to any requisite degree by common and known means. The picker, placed as aforesaid, consists of a cylinder with points set therein, so placed in respect to the delivering end of the feeder as to take the fur and tear it from between the delivering rollers of the feeder and distribute it to the wheels as aforesaid. The feeder is of common construction, and the wheels and picker are put in motion by a band running over wheels fixed to their respective axes;

the motion of the feeder is adapted to the picker, and the motions of these are adjusted to each other and to the wheels, so that the machine shall have in all its parts a convenient velocity, according to the quantity of fur to be cleared and the supply conveyed to the machine by the feeders in a given time. The number of wheels and their dimensions are left at large, because these may be indefinitely varied, and yet the principle of the machine be the same, as hereinafter is shown. But the number of wheels, and their dimensions, actually used by this applicant in his first operation, were as follows—there were 7 wheels from 6 inches to 2 feet in diameter. The dimensions of the frame, and of the cover, and of the picker, and of the feeder, all obviously depend upon, and are adapted to the number and dimensions of the wheels. By a machine of this description the applicant has cleared fur of hair perfectly in one operation.

The principle of the invention consists in the combination of wheels with a cover lined with cloth, substantially, as above described, having a feeder and a picker of common construction, the dimensions of the same being variable at convenience as aforesaid.

And this applicant contemplates the application of this principle in combination with any common and known apparatus for electrifying the cloth lining, and purposes on further experiments to apply for patents for such and other improvements.

William Woodworth.

At fig. 6, Pl. XIV. is given a perspective view of the whole machine, and fig. 7, one of the wheels, or beaters, which revolve in the cylindrical cases.

Abstract of the specification of a patent for an improvement in the mode of casting and making of Metallic Tubes, or Pipes, of lead and other soft metals, or composition of metals. Granted to Burroughs Titus, *Ulyssus, Tompkins county, New York, April* **19, 1831.**

The object of this patent is to produce pipes of any desired length, without seam or joints. The plan is to conduct the fluid metal into a mould of a proper form, but of moderate length, and causing the metal to be cooled so as to adhere, and at the same time giving a regular motion to the tube, so as to draw or force it from the mould as fast as it becomes effectually cooled.

The apparatus by which this is to be effected is shown in the drawing at fig. 8, Pl. XIV.

A. A, is a hollow cylinder of metal, bored out, so that its inner diameter shall be equal to that of the pipes intended to be cast. Its length for a pipe of 1¼ inch, may be about 8 inches. It has a flanch, *a, a,* at its lower end. This tube gives the form to the outside of the pipe to be cast. B, is a plug or core, adapted to the inside of the pipe, and made of iron, or other suitable metal; it must be perfectly smooth, and slightly tapering, being smallest at top. It has a flanch, *b, b,* adapted to the flanch *a, a;* this flanch is perforated with

a number of holes, to allow the fluid metal to pass up into the mould. C, C, is a basin to contain water, standing up to the dotted line, *f, f.*

D, D, is a tube by which the melted metal is to be conveyed from the melting pot, F, into the mould. A, stop cock, regulates the flow of the metal. The tube D, D, is furnished with a flanch *c*, by which it is connected with the mould.

The melting pot may be placed so high up that the pressure of the melted metal will be sufficient to force the pipe from the mould, with a regular motion, as it is cooled by the water, this force being regulated by the quantity admitted by the stop cock. The pipe D, D, must descend through a flue kept sufficiently heated to keep the lead in a fluid state, and heat must also be applied at its junction with the mould. Instead of elevating the melting pot, an arrangement may be made for making a mechanical pressure upon the surface of the lead, and thus to produce the same effect.

The pipe as it is forced off, may be received upon a reel, or drum, placed above the mould.

We have omitted a large portion of the specification, but have given what is necessary to render the plan intelligible. A patent has been obtained in England for machinery for the same purpose, but not of the same construction. We believe that under proper modifications, which experience alone must suggest, the principle above described may be advantageously applied to the accomplishment of the object proposed.

Specification of a patent for an improvement in the process of Dressing Woollen Cloths, and Cloths composed partly of Wool and partly of Cotton. Granted to Calvin W. Cook, *Lowell, Middlesex county, Massachusetts, April* 23, 1831.

The description of this process is as follows:—Take broad cloths, sattinetts, or any like cloths to be subjected to the process, after they have been fulled and rinsed clean, but before the pile or nap has been raised upon them, and wind them upon wooden rollers or cylinders, as tight as can be done without tearing the cloth. Confine them with a twine tied around, so that the cloth cannot unwind, and so that the whole may remain firm and tight upon the roller or cylinder; then prepare a kettle or cauldron, of sufficient dimensions to receive the roller or cylinder, with the cloth upon it. Fill the kettle or cauldron, after having put the roller or cylinder, with the cloth upon it, therein, with water, and apply heat thereto, until the heat rises from one hundred and eighty to two hundred degrees of Fahrenheit's thermometer, for all cloths excepting whites and blues; and for the last mentioned colours the heat may be raised to two hundred and twelve degrees, or to boiling heat. The other colours will not endure so great a degree of heat; the degree of heat can best be decided upon by experience from time to time, owing to the various ways of producing the different colours in the different parts of the country. The degree of heat above-mentioned, it is believed, will, in general, best answer the purpose without injury to the cloth.

The water should be kept at the degrees of heat above-mentioned, for the space of six hours; after which the cloth should be taken from the water, and suffered to cool upon the roller or cylinder, which will usually take about twenty-four hours.

Instead of water steam may be applied, at the same temperatures, for the same length of time, and will answer the same purpose; but in this case the cloth must be wound around a revolving roller or cylinder, which must be kept continually in motion during the process, and the steam must be confined by a wooden box, made very tight, so as to include the rollers or cylinders, with the cloth upon them, within it. The cloth is to be taken out and cooled in the same way as when heated by water. The operations above-mentioned render the cloth very firm in the bottom, divest it of wrinkles and cockles, or drawn places, and render it even and smooth on the surface, so that the teazles or points may act uniformly upon the cloth, and the fibre of the wool or cloth is thus rendered more pliable, and is more easily turned and laid straight and smooth in the process of teasing, or raising the pile or nap thereon. And I, the said Cook, do hereby expressly declare, that all that I claim as new, and of my invention or discovery, is the subjecting the cloth to the process aforesaid, in the manner aforesaid, and for the purposes aforesaid, after the same has been fulled, and before the pile or nap has been raised thereon by the process of teasing.

CALVIN W. COOK.

Specification of a patent for a Composition for the making of Beer. Granted to STEPHEN HINDS, *Montrose, Susquehanna county, Pennsylvania, May* 11, 1831.

To all to whom these presents shall come, be it known that I, Stephen Hinds, of Montrose, in the county of Susquehanna, and state of Pennsylvania, have invented a new and useful composition for the making of beer, and that the following is a full and exact description of the composition and process of compounding the same, as invented by me, to wit:—one pint of molasses, one pint of new milk, and one pint of common hop yest, are put into a six gallon keg, which is then filled with air by means of a pump, or in any other mode most convenient, until no more can be compressed into the cask; it is then corked up, and let remain in that state for twenty-four hours. At the expiration of that time, two gallons of water are mixed with one quart of molasses, one ounce of ginger, half an ounce of allspice, and half an ounce of the essence of spruce, heated boiling hot, and put into the cask, with three and a half gallons of cold water, again corked up, and permitted to remain twenty-four hours longer. The beer will then be fit for use. When the beer is drawn out, except two quarts of the sediment, which should be left in the cask, the last described composition can be again added to it, and so on during the season.

What I claim as new, and as my own invention in the above described manufacture, and composition, and for the use of which I

ask an exclusive privilege, is the composition first above described, the proportions of the second described composition, and the whole process of making.

The whole of the beer should be drawn without a vent. The carbonic gas generated in the beer, renders one unnecessary.

STEPHEN HINDS.

Specification of a patent for an improved Machine for Cutting Grass, and Grain. Granted to WILLIAM MANNING, *Plainfield, Essex county, May* 3, 1831.

I PROVIDE an axle-tree with two wheels, of the common construction. To this axle-tree I attach shafts, by which a horse is to draw the machine. From the axle-tree extend two arms, in the direction of the shafts; these arms are morticed into, or otherwise attached to the axle-tree; they are of greater length than the shafts, extending beyond them a sufficient distance for the cutting apparatus to be entirely clear of the horse. The two arms are united together by a cross bar at their extreme ends; which cross bar, when the machine is in action, rests, and slides forward on the ground; teeth, of six or eight inches in length, more or less, are set like rake teeth, standing forward on the cross bars. These are made slender, and are for the purpose of holding the grass or grain to be cut.

The cutters stand immediately above the teeth, and receive a traversing motion in a way to be presently described.

A flat bar of iron lies along upon the cross bar, and the cutters are to be attached to this upper bar. The cutters are spear shaped, and are sharpened on each of their edges. They may vary in their length and width, but ordinarily they may be about six inches long, and three or four wide at their bases. The grass or grain, which is held up by the teeth, passes between these knives or cutters. To give a traversing motion to them, a lever may extend from the inner end of the hub of one or both of the wheels to the cutter bar; this lever may work upon a pin at or near its centre; a zigzag groove in the hub, or in a wheel attached to it, will give it a vibratory motion, and its connexion with the cutter bar at the opposite end, will cause that to traverse.

I intend sometimes to make the cutters revolve instead of traversing. They are then to be fixed upon the periphery of a wheel, the teeth being placed on a fixed semicircle. The cutters will then have one sharp edge only. The wheel may be made to revolve by bands or gearing, from one of the main wheels, in various ways.

When the machine is small, it may be moved by the power of a man. The shafts may be fixed forward of the cutters, and the general arrangement be varied, without altering the main principle of my machine.

What I claim as my invention, and for which I ask letters patent, is the combined action of the teeth and cutters, whether the cutters are moved in a traversing or a revolving direction.

WILLIAM MANNING.

ON PRESERVING ANIMALCULÆ.

(Being a Supplementary Note to a paper by Mr. Cornelius Varley, inserted in the last volume of the Transactions of the Society of Arts, &c.)

WATER stocked with vegetation is likely to abound in animalculæ; therefore, during warm weather, we seldom fail of finding great varieties in ponds and stagnant ditches. Also, any vegetable matter suffered to decay in water, with free access of air, produces animalculæ. Such stagnant water is liable to become so foul and disgusting as to kill all the larger sort, and yet will abound with a very minute sort rather peculiar to that state. Wishing to examine these varieties, we are frequently tempted to endure the offensive nuisance. If, whilst some vegetable matter is dissolving, other plants are in a healthy growing state, the water will be kept sweet, and the most beautiful and interesting animalculæ will thrive; but the water is liable occasionally to become foul throughout, or the deposit at bottom becomes foul, and when this is the case the animalculæ can only live at the top. In some cases I have removed the whole of this offensive deposit from the bottom of a glass jar or vial, by the tube fig. 30 or 31, Pl. IV., putting it to the bottom quite empty, and then letting it fill; and by replacing my finger at top, lifting it out, and then adding rain-water to fill up the jar, if I wish to preserve the particular kinds of animalculæ that are already in the jar; for common cistern-water is liable to bring some of their enemies with it.

Having various jars, some stocked with vegetation and others with animalculæ, all within doors, I removed entirely all disagreeable smell or effluvia from the room, and kept a sense of perfect sweetness, by leaving a bottle of nitric acid open in the room. The success of this made me try to cure the water as well as the room: I therefore put a few drops of nitric acid in a glass of water, so as to produce only a pleasant taste when the tongue was dipped into it, and not a sharpness. I then took tubes full of this, and putting the end down to the bottom of the jar, removed my finger from the top, and breathed into the tube just enough to expel the acidulous water, but not to let the air bubble through. This had the desired effect; for, in a day or two, the animalculæ were found much nearer to the bottom. From a glass jar, holding about half a gallon of water, in which a large quantity of vegetable matter was put to decay, that it might become food for *chara*, the smell had become strong and disagreeable. To this I added about a wine-glassful of acidulous water, in very small quantities at a time, by means of the glass tube, and each portion was expelled from the tube into different parts of the jar, so as to mix it as equally as possible with the water. This, though six or eight weeks since, has, up to the present time, removed all smell from the water, and left it well stocked with animalculæ, among which are plenty of bell polypus, and *chara* is growing up from the bottom; but it has prevented those myriads of minute animalculæ that appear to be the only substance remaining at the surface of such stinking water.

My reason for trying the nitric acid in this case, was its success in preventing contagion, having from my infancy used its vapour for that purpose. It removes all smell or sense of closeness from a sick chamber, thereby encouraging the humanity of attendance. From whatever cause, either of uncleanliness or otherwise, a place contracts a disagreeable smell, I have found the nitric acid fumes restore it to perfect sweetness, and therefore I expected it to remove the smell from vessels containing animalculæ; and now I find, by a cautious use, it will do so without killing them. By leaving a bottle of the acid open in a room, it produces only a very slight and pleasant smell of the acid when we come fresh into the room, but not enough to be sensible whilst remaining in it; and living in such an atmosphere, during the prevalence of any contagion, has rendered me fearless of going into any place of danger from such a cause. For, on one occasion, when influenza attacked a great many persons in London, every person in our house was affected but myself and brother, we being chiefly occupied in a room that I had so guarded, by placing a two-ounce vial of nitric acid on the mantle-shelf; yet we had been most exposed by visiting families where it prevailed. I have added this statement to draw attention to the use of these fumes at the present period, an alarm of contagion being abroad*.

CORNELIUS VARLEY.

MISCELLANEOUS.

TINCTURE OF ROSES.—Take the leaves of the common rose (*centifoliæ*) place them without pressing them in a bottle, pour some good spirits of wine upon them, close the bottle, and let it stand until it is required for use. This tincture will keep for years and yield a perfume, little inferior to attar of roses: a few drops of it will suffice to imgregnate the atmosphere of a room with a delicious odour. Common vinegar is greatly improved by a very small quantity being added to it.

DICTAMUS FRAXINELLA.—There is a singular phenomenon attendant on this pungently-fragrant plant. If, after a very hot day, a flame be applied near the blossom, its exhalation will blaze beautifully.

USE OF TOBACCO BY THE HOTTENTOTS.—Mr. Barrow, in his Travels, speaks of the use made by the Hottentots of this plant, for the purpose of destroying snakes: "a Hottentot," says he, "applied some of it from the short end of his wooden tobacco-pipe to the mouth of a snake while darting out his tongue. The effect was as instantaneous as an electric shock: with a convulsive motion that was momentary, the snake half untwisted itself, and never stirred more, and the muscles were so contracted that the whole animal felt hard and rigid.—*Penny Magazine.*

* The vapour of nitrous acid was used by Dr. Carmichael Smith, in 1780, for destroying the miasmata of certain infectious diseases.

Remarkable Detection of Fraud.—A few years ago an important suit, in one of the legal courts of Tuscany, depended on ascertaining whether a certain word had been erased by some chemical process from a deed then before the court. The party who insisted that an erasure had been made, availed themselves of the knowledge of M. Gazzeri, who, concluding that those who committed the fraud would be satisfied by the disappearance of the colouring matter of the ink, suspected (either from some colourless matter remaining in the letters, or perhaps from the agency of the solvent having weakened the fabric of the paper itself beneath the supposed letters) that the effect of the slow application of heat would be to render some difference of texture or of applied substance, evident, by some variety in the shade of colour which heat in such circumstances might be expected to produce. Permission having been given to try the experiment, on the application of heat *the important word reappeared*, to the great satisfaction of the Court.—*Babbage on the Decline of Science.*

Travels.—In the year 1820 the government of the United States sent an expedition to explore the Stony Mountains, and the country to the west of that chain, to the ocean. After an interval of eleven years, news has been received of the proceedings of the travellers. They landed in Green Bay, in Lake Michigan, where they passed the winter. They then crossed Dog's Meadow, to the Falls of St. Anthony, on the Mississippi. They next proceeded 200 miles up St. Peter's River, in search of lead mines, and were so fortunate as to discover some of considerable importance. Here they passed the second winter. They then proceeded down St. Peter's River to the Mississippi, and down the latter to the junction of the Missouri, and up that river to the foot of the Stony Mountains, where they passed the third winter. In the middle of August they crossed the Chain, and remained eight years on the western side of it. During this long period they were near the coast of the frozen ocean, and even passed over into Asia. In the vicinity of the Columbia they were overtaken by a storm, in consequence of which they were obliged to build huts, and to remain there nine months. The snow lay fourteen feet deep, and want compelled them to kill forty-one of their pack-horses for food. Among the various discoveries which they have made are extensive strata of salt, alum, iron, copper, gold, and silver.

List of New Patents Sealed omitted in our last Number.

Ships' Compasses.—To T. Preston, of the Minories, London, nautical brazier, for an improvement in ships' compasses.—Dated 26th May, 1832. Specification to be enrolled in two months.

Dying.—To F. Steiner, of Church, near Blackburn, Lancaster, chemist, for an invention of a process, by which spent madder may be made to yield a great quantity of colouring matter, and for dying with the same various colours of cotton, linen, wool, silk, &c. Communicated to him by a foreigner residing abroad.—2nd June. Two months.

Mangle.—To W. Hubie, of York, joiner, for an improved mangle.—2nd June. Two months.

Canes.—To J. A. Taylor, of George Street, Hanover Square, Esq. for his having invented an improved whipstick or cane, to be used when riding. 5th June. Two months.

Ventilation.—To J. Sylvester, of Great Russell Street, London, engineer, for his improvements in apparatus for raising the temperature of air to warm and ventilate buildings —5th June. Two months.

Carding.—To H. Bolton, of Sharples, Lancashire, carder, for an improvement in machinery used for carding cotton and other fibrous materials. —5th June. Two months.

Air.—To J. Perkins, of Fleet Street, London, engineer, for improvements in blowing and exhausting air, applicable to various purposes.—9th June. Six months.

Gas.—To G. Lowe, of Brick Lane, Old Street, Middlesex, civil engineer, for his invention for increasing the illuminating power of such coal gas as is usually produced in gas works; also for converting the refuse products from the manufacture of coal gas, as is usually produced in gas works, into an article of commerce not heretofore produced therefrom; and also for a new mode of conducting the process of condensation in the manufacture of gas for illumination.—9th June. Six months.

Steam Engines.—To W. Brown, of Liverpool, merchant, for improvements on steam engines. Communicated to him by a foreigner residing abroad.—9th June. Six months.

LIST OF NEW PATENTS SEALED.

Heating.—To E. Garsed, of Homerton, Middlesex, gentlemen, and Alfred Robinson, of Mild End, in the said county, merchant, for improvements in apparatus, for heating, warming, and ventilating drying houses, rooms, buildings, ships, and mines.—22nd June. Six months.

Music.—To H. G. Gillet, widow of the late A. W. Gillet, of Birmingham, merchant, (in consequence of a communication made to her late husband by a foreigner residing abroad), of an improved machine to measure, beat, and give the accents in all the different modes of time with any degree of velocity required, applicable to the teaching of music.—28th June. Six months.

Musical Instruments.—To F. W. Isaac, of Charlotte Street, Fitzroy Square, pearl-worker for improvements in ornamenting the finger-keys and other parts of the pianofortes, organ, and other musical instruments.—28th June. Six months.

Railways.—To J. Macdonald, of the University Club House. Pall Mall East, Middlesex gentleman, for an improved construction of railways. Communicated by a foreigner residing abroad.—29th June. Six months.

Spinning.—To A. B. Shankland, of Liverpool Street, London, Esq. for a new method of spinning wool. Communicated by a foreigner residing abroad.—5th July. Two months.

Heating.—To W. D. Holmes, of St. John Square, Middlesex, engineer, for a new method of heating houses and other buildings, &c.—19th July. Six months.

Ploughs.—To T. and R. Wedlake, of Hornchurch, Middlesex, agricultural instrument makers, for improvements in ploughs, &c.—19th July. Two months.

Baking.—To R. Hicks, of Wimpole Street, Middlesex, Esq. for an improved apparatus for baking bread. 19th July. Six months.

Dying.—To W Hodge, of Margaret Place, Dover Boad, Surrey, hat-dyer, for improvements in apparatus for dying hats.—19th July. Six months.

PATENTS ENROLLED BETWEEN 10TH AUGUST, AND 10TH SEPTEMBER, 1832.

Particularizing the Offices in which the Specification may be inspected, with the Dates of Enrolment.

MILLS.—To C. M. Savoye, of Oxford Street, in the county of Middlesex, Merchant, a patent "for an improvement or improvements in mills or machines for grinding, or reducing grain and other substances," was granted on the 15th of December, 1831, and the specification was deposited in the Enrolment Office on the 13th of June, 1832.

The nature of these improvements are stated to consist; first, in a peculiar modification of the parts which constitute the rubbing or grinding surfaces; second, in giving to the said surfaces an alternating circular motion; third, in surrounding the said mills with water or other fluid, at a low temperature, to abstract and carry off the heat generated by the friction of the machinery and the substances operated upon.

The invention, *in its simplest form*, consists of two principal parts, as delineated in perspective by figs. 8 & 9, Pl. XV. Fig. 8 is a circular piece or ring of cast iron (or other suitable material) which is made fast in a horizontal position to a strong frame of wood or metal, by means of ears or lugs, two of which are brought into view at *a a*. The exterior side of the ring is perpendicular, but the interior is inclined or sloping, where it is furnished with a series of inclined teeth *b b*; these teeth project beyond the smooth surface about a twelfth of an inch at their upper ends, but gradually diminish in their projections or thickness downwards until they arrive at the smooth surface, (or as workmen express themselves, "terminate at nothing"); but just previous to their arrival at this point they are met by a series of small grooves or gutters *c c*, which are intended for the passage of the bran or other parts of the ground materials, as well as to permit the transmission of currents of air through them. Fig. 9 represents a perspective view of the inner ring or moving wheel, made of similar materials to fig. 8, and provided externally with a circle of similarly formed teeth (marked also *b b* and *c c*) except that they are inclined in the reverse direction, for the purpose of producing, by their opposite position, a clipping or scissors-like action. This inner ring is also made a little inclined or conical externally, so as to fit concentrically within the outer ring, and bring their respective teeth either to touch or approach each other at uniform

distances apart throughout the annular space formed between them. For the clearer explanation of this arrangement, a plan of the two rings is given by fig. 10, in which the parts are reduced to one half the size, linear measure, of the former. Thus *d d* represents the outer ring, and *e e* the inner ring; between these are represented three concentric circular lines; the space between the middle line to the outer denotes the thickness of the upper extremities of the teeth of the outer toothed ring; the space between the middle line and the smallest circle the thickness of the extremities of the teeth of the outer ring, and the breadth of the middle line may be considered to indicate the space through which the flour, or other reduced substances, pass out of the mill. In this figure the ears or lugs are shewn, with holes made through them for the purpose of fastening them by screw bolts to the framing *i i i*: *j* is a central spindle fixed to the inner ring *e*, upon which it turns. The motion imparted to this wheel is not rotative, but alternating through only a portion of its circumference by the action of a vibrating rod *k*, which will be better explained in connection with fig. 11. This figure exhibits a vertical section of the principal parts of the mill; *a* shews one of the lugs or ears, *d d* the outer toothed circle, *e e* the inner; and between them, on either side, the three lines converging to a point represent the teeth. The interior circle *e* is covered with a conical cap of sheet iron *l*, and the outer circle *d* by a cylindrical open topped hopper *v*, the space between this hopper and that cap being appropriated to the reception of the corn or other substances to be ground. The alternating motion given to the inner toothed circle *e* is thus effected: a lever, *m n*, is fastened by a nut and screw to one of the arms of the inner wheel *e*, and also to the axis *j*, which constitutes the latter the fulcrum of the lever; the other end of this lever passes through the framing, and is attached to the extremity of the rod *k*, which is made to vibrate by the revolution of a crank, actuated by any convenient power.

As the weight of the inner circle would cause it to come in contact and press upon the outer, if unsupported by other means, the following arrangement is adopted by which it is supported, and the required space between the grinding surfaces is at the same time adjusted. The spindle *j* turns in a socket *p* (fixed to the framing), its extremity resting on a bolt *q* that passes loosely through a hole in the framing, and the end of the latter is supported upon the extremity of a lever *r*, which has its fulcrum at *s*, and is acted upon by a screw *t*, the turning of which causes

the inner grinding circle *e* to be elevated or depressed, and thereby removed farther from, or nearer to, the outer grinding circle; thus adapting them to grind coarse or fine, at pleasure.

When the material to be ground is so hard as to create such a resistance to the action of the mill as to cause the inner ring *e* to rise up, and thereby allow the materials to pass unground, or insufficiently reduced, out of the mill, a screw stop represented at *u* is put into requisition; this screw-stop passes through a tap in the socket *p*, and enters a groove formed in the spindle *j*, thereby preventing the spindle and the circle *e* from rising up beyond its assigned limits, which may be easily adjusted by such obvious adaptations as not to need our particularizing.

This mill is put into action by a winch on the axis of a fly wheel (not represented). On the same axis is a crank, the rotation of which actuates the vibrating rod *k*, producing the alternating motion of the lever and mill, as before described. In the drawings already referred to, it is intended to represent a mill of only ten or twelve inches in diameter, which requiring but little force, a *quick* motion is easily given to it by hand, without increasing the velocity by gear. But when it is desired to employ the entire strength of a man, a mill of from fifteen to eighteen inches in diameter is preferable; in this case, the operator will work to more advantage by employing a slower first motion, and obtaining the required velocity of the mill by means of gear. The number of vibrations or alternations of the mill may vary from sixty to one hundred in a minute, without materially affecting the result; but a preference is given to about eighty vibrations per minute. The principal inconvenience that would be produced by too rapid vibrations, is the heating of the flour or other materials; and to prevent this effect a stream of water is caused to pass through an annular cavity made in the outer or fixed grinding circle. The water enters by a pipe on one side of the circle, and is carried off by another pipe on the opposite side of the circle; the pipes being furnished with stop cocks to regulate the admission and emission of the fluid.

In constructing mills requiring a force equal to one or more horses, the patentee does not confine himself to a single pair of grinding circles, as already described, but employs any convenient greater number, by which arrangement the mill is rendered more compact, when compared with its increased efficiency. In the specification is described and figured a mill containing five

concentric circles; three of them are fixed to the frame or bed of the mill, and the two others which fit alternately between the three first are made to reciprocate by similar means to that before described. Thus four pair of rubbing surfaces are brought within the circumference of the outer ring. The three rings are fastened together by four radiating bars, and the two rings which move between them are connected in a similar manner.

In applying water to this mill, it may be conducted underneath the three fixed circles into the hollow annular spaces formed within them, by any of the known modes practised by workmen, and afterwards conducted off to a lower level. Although the cooling of these three rings by currents of water (or other fluid) passing through them, will tend materially to reduce the temperature of the intermediate rings, water may be passed through these also; it may be introduced from above the mill through a hollow vertical axis, and distributed thence by the radial connecting arms into the rings, whence by another passage it may be carried off through the lower portion of the said hollow axis. A similar mode may be adopted of conducting water through the inner ring of the first described mill, but the patentee considers that it would be unnecessary except in large mills moved at great speeds, and that the application of water to the outer ring of a single mill (as that first described), or to the intermediate or alternate rings of mills containing a greater number of concentric circles than two (as in the quadruple mill last described) will in most cases be found sufficiently efficacious.

It will be observed that the teeth or notches on the surfaces of the mill described are *inclined*, the consequence of which is, that the grinding is not equally effective in the two reverse motions of the mill. To equalize the grinding effect in both directions, the patentee gives the preference to upright teeth, instead of inclined. The power required to work mills with upright teeth must of course be augmented, but the effect is greater in proportion, and the resistance as well as the requisite power is more uniform.

The claims to invention are *first*, the alternating circular motion, by whatever mechanical combination it may be produced, not only to the mills described, but to all other mills susceptible of its application. *Secondly*, the forming of compound mills by the combination of a greater number of grinding circles than two, and the driving of these not only by *alternating* circular

motion, but by continuous circular or rotatory motion. *Thirdly*, the introduction and passage of water, or other fluid (employed as a cooling medium) into and through not only the mills described, but to all metallic mills susceptible of its application.

PENS.—To J. Perry, of Red Lion Square, London, a patent for "improvements in or on pens" was granted on the 28th of January, 1832, and the specification was enrolled in the Enrolment Office on the 27th of July, 1832.

In vol. v. p. 194, of the *Register of Arts*, we gave an account of several modifications of Steel Pens, patented by Mr. Perry, and we have on the present occasion to submit to our readers another series, containing no fewer than seven different forms, all having for their object the diminution of the strength of the nibs near the shoulders, that the pen, while in use, may more readily yield to the irregularities on the surface of the paper, and by that means afford greater facility in the operation of writing. The two principal modifications, and those which are at present manufactured by the patentee, are represented by figs. 5 & 6, Pl. XVI., by which it will be perceived that the pens are weakest at the extremity of the points and immediately under the shoulders, by which elasticity is obtained where it is principally wanted. When steel pens have been made very fine at the nibs, to give sufficient elasticity to them, their durability has been decreased by the nibs taking a set open, and when the slits have been considerably elongated to give them pliability, they are liable to open so wide by pressure, that the ink flows imperfectly, and the pens soon become useless. That the plan before us will entirely remedy these defects, we are not prepared to maintain, but that Mr. Perry has devoted his attention to the defects of his former, as well as of the steel pens manufactured by others, is very clear by mere inspection, and trial has convinced us that he succeeds by his present plan in manufacturing good pens: how far they will turn out to be lasting ones time has not yet enabled us to ascertain.

FLUIDS.—To C. Smith, of Bishopsgate, London, a Patent for "an apparatus for regulating the action of fluids and liquors," was granted on the 31st of January, and the specification was lodged in the Enrolment Office on the 31st of July, 1832.

The regulation of the action proposed by this patentee is an

arrangement by which the equal quantities will be discharged from the same aperture in equal time, notwithstanding a variable altitude in the column of fluid in the reservoir or vessel from which the discharge is obtained. This he proposes to effect by means of a strict and mathematical application of the laws of equilibrium, and a new mechanical organization: he proposes an additional vessel through which the fluid passes, and which is furnished with an aperture in its bottom, through which the fluid ascends into the vessel, a valve to this aperture opening downwards, a float connected by a slight rod with the bottom valve, and a discharge pipe through which the water passes. A pipe conveys the fluid from the the reservoir to the valve box under the regulating discharge vessel, which must be placed below the level of the reservoir: the fluid thence ascends in this vessel till it raises the float and partially closes the valve by lifting it up closer to the aperture, which it partially closes, and consequently diminishes the supply. In the mean time the fluid continues to escape at the discharge pipe, till the column in the regulating vessel is diminished, and the float descends again, the valve is opened wider, and an additional supply is the consequence. Although we have, in imitation of the patentee, and for the sake of clearness, described the float as being continually in motion up and down, yet a very little consideration of the nature of the apparatus will shew that this will not, in practice, be the case, as the least tendency to change will immediately be corrected by the counteracting force of the water issuing up through the charging aperture in the bottom of the vessel. Hence the altitude of the column of fluid in the regulating vessel will not be materially changed by diminution or augmentation of the quantity of fluid in the reservoir, and consequently the issue at the discharge pipe will continue uniform.

In order to secure the perfect adjustment and action of this apparatus, the valve must be made parabolic when the float is cylindrical: and the diameter of the float must be equal to the square root of the surplus column multiplied by the diameter of the valve, and divided by the extent of motion of the valve.

Amongst other applications of his invention, the patentee proposes that of rendering the supply of oil to a lamp, and shows at considerable length several plans adapting the invention to that purpose. He likewise proposes an improved gas burner of the argand kind, which, instead of having a flat surface of considerable breadth, with a series of small apertures on the top, by which, he states that the oxygen for the support of the com-

bustion cannot reach the hydrogen immediately as it issues without being considerably heated, he proposes to make the burners to taper both inside and out to a very thin top, and there to have an annular slit or circular opening instead of the circle of small holes. The intention of the tapering form is to obtain a better supply of oxygen, and the intention of the annular slit is to obtain a ready means of cleaning the burner and at the same time preserving the uniformity every where.

TRANSPORTING GOODS.—To W. H. Church, of Birmingham, a patent "for improvements in apparatus to be employed in the transportation of goods or passengers, &c.," was granted on the 9th of February, and the specification was deposited in the Rolls' Chapel Office on the 9th of August, 1832.

A steam carriage to travel on common roads is the apparatus proposed to be employed by Mr. Church in the transportation of of goods or passengers, and the principal novelties of the invention are stated to be first, the construction of the frame work containing and supporting the machinery so as to give the greatest strength with the least quantity of material, or with the least weight, a matter of much importance to locomotive contrivances. Secondly, the construction of the boiler, flues, and apparatus connected therewith, so as to obtain a sufficient quantity of steam with the smallest expenditure of fuel: and, thirdly, the construction of the running wheels, which are to be made with elastic rims to prevent concussions when they come in contact with irregularities on the road.

The frame work is to be made principally of bars of wood not morticed together in the usual manner, but united by X T or L pieces of flat iron bolted on each side, as the case may require. The frame work incloses a space between a hind and fore body of the carriage, and of the same height as the carriage, and this space the patentee denominates an engine room, as within it are deposited the engine, boilers, and apparatus for giving motion to the carriage; the bars of wood constituting the skeleton frame of this engine-room are to be united together in such positions, and the principal pieces trussed and supported by diagonal spurs and braces, that the weight will be equally distributed throughout the supporting frame, and the strength of each part is to be proportioned to the quantity of pressure it may have to sustain. We have not deemed it necessary to enter upon a more detailed description of the frame work of Mr. Church's steam carriage, as

the rules for proportioning and combining the pieces may be found in any work on constructive carpentry. It is however mentioned in the specification, that the frames may be made of iron rods as well as wood, and in that case the pieces are to be united together by means of sockets and binding keys.

The boiler proposed by this patentee is of the tubular kind, consisting of a series of tubes placed vertically side by side, in a circular, octagonal, or any other convenient form. Within each of the tubes constituting the boiler is introduced a pipe which passes through, and is secured at the bottom of the boiler tube; these interior tubes are made open to the fire at the bottom, and constitute the flue. The boiler tubes are made open at top, and each of the flues are made to pass up one of the boiler tubes and down another, till it reaches as low, or lower, than the bottom of the fire-place; from thence it passes off to a general flue in communication with an exhausting apparatus. The flue tubes the patentee denominates syphon tubes, from their taking that form, the leg farthest from the fire being made as much longer than the other as the water in the exterior portion of the boiler descends below the place where the smoke and heated air enters the flue tubes. Between each of the boiler tubes and its interior flue tube, is introduced a series of small pipes reaching from nearly the top to nearly the bottom, and left open at both ends, except that small caps or shields are placed opposite the lower ends at a small distance therefrom, to prevent the entrance of steam bubbles at their lower ends. The object of these small pipes is to cause a constant current of water in the boiler tubes, as it will descend the small pipes, when its heat is increased it will ascend on the exterior of the small pipes. Above the boiler tubes is a general reservoir and steam chamber of a cylindrical form, into which they all enter, and through the middle of this cylinder is a shaft through which the fire is supplied with fuel. This feeding shaft is furnished with two doors, the one to open upwards at the top to receive the fuel in the first instance, and the other in the form of a damper or drawing shelf, which is to be withdrawn to let the fuel resting upon it fall into the fire. But one of these doors is never to be opened till the other is closed, so that there may be no communication between the fire and the atmosphere through the feeding shaft.

For the purpose of obtaining an abundant supply of atmospheric air to the fire, two revolving fans are employed, the one to force in air above and below the fuel in the furnace, and the

other to exhaust or draw off the smoke and impure air through the flue tubes which receive their supply from about the middle of the fire. These blowing machines are placed over the engine room and put in motion by a strap and rigger from the crank shaft of the engine.

The driving wheels are made elastic in two ways; first, the rims are made of three or more hoops of wood comparatively thin but wide, and around these is placed an iron tire of the usual construction, but thinner, that it may yield to increased pressure. The hoops of wood constituting the felloes of the wheel are further secured together by a series of straps coming from the tire down on each side of them; and, secondly, these straps are secured by a kind of hinge joint to a series of flat steel spring-tempered spokes which are placed with their planes at right angles to the plane of the wheel, and made somewhat curved, that their elasticity may more readily come into action. The inner ends of these spring spokes are connected by hinge joints with a middle ring of the wheel, and this middle ring is connected with the nave by inflexible rods.

The advantages of this elastic wheel are stated to be threefold; first, they prevent the injurious effects resulting from violent concussions: secondly, they obviate in a great measure the necessity for carriage springs: and, thirdly, by yielding, they come into contact with a large portion of the surface of the road, and thus prevent the wheels from being turned round without moving the carriage forwards.

Although these wheels are intended to obviate in a great measure the necessity for carriage springs, yet Mr. Church uses them in combination with air springs, and for that purpose provides two or more cylinders made fast to the body of the carriage in a vertical position, closed at top and furnished with a piston with packing similar to the cup leather packing of the hydraulic press, this piston is kept covered with oil to preserve it in good order; and a piston rod connects it with the supporting frame of the carriage.

Motion is communicated by two steam cylinders made to oscillate, being suspended on the ends of the eduction and induction pipes over the crank shaft. The crank shaft and driving wheel axle are connected together by means of chains passing about notched pulleys; and there being two pairs of these pulleys of different sizes with respect to each other, the power may be varied

by shifting the motion from one pair to the other by clutch boxes of the usual construction.

SILK PRINTING.—To C. M. Payne, of Stratford Westham, Essex, a patent for "improvements in printing silk, cotton, and other goods," was granted on the 5th of December, 1831, and the specification was enrolled in the Roll's Chapel Office on the 15th of June, 1832.

The patented inventions of Mr. Payne are of two kinds; the one applicable to plate or block printing, and the other applicable to cylinder printing. Fig. 1, Pl. XVI., shows a frame for supporting the plate of copper, or other suitable material, on which the intended design is engraved. *a a* is an exterior frame, which is represented at *c c*, fig. 2, resting on the platform of the printing press; *b b* shows a ledge supporting and forming a rail-way, for a block on which is fixed the copper plate; *c c* are cross rails on which the block is moved from one side of the frame *a a* to the other. *e e e e* are stop-screws, to adjust the transverse motion of the frame to the width of the piece of silk, cotton, or other goods under operation. *d* is the engraved plate, fixed upon its supporting block. Fig. 2, Pl. XVI., shews the form of the press; *g* is the supporting cylinder, between which and the cylinder *h* the impression is given; *i i* are two guide rollers, over which is passed the piece of silk, or other goods, during the operation of printing. *f f f* are three friction rollers, for the support of the plate stage in its passage forwards and backwards while in use.

The engraved plate, being inked in the usual manner, is passed in on the traversing frame, between the cylinders *g* and *h*, to give the impression to one side or half breadth of the piece of goods as it passes round the cylinder *h*; the press is then moved back, the plate block is moved across, on the rails *c c*, to the other side of the frame *a a*, which is to be again passed in between the pressure cylinders, to give an impression to the second half breadth. The plate frame is now to be moved back from the pressure cylinders, and the piece of goods is moved forwards a space equal in length to the engraved plate; a second impression on the first side is now to be given, and the before-mentioned process repeated, so that a continuous impression will be communicated to the piece.

When, however, the piece to be printed consists of handkerchiefs with the same corner towards the centre in all the impressions, the plate block is made to rotate on a pivot fixed in the

centre of the block, so that when it is passed from the first to the second position, it is turned a quarter of a revolution on its centre pivot, and when it is passed to the third position, it is turned another quarter of a revolution, and so on, that the same corner of the plate may be towards the middle of the handkerchief when all the four impressions are given. Another modification consists in placing the pivot on which the block rotates under the corner of the plate coincident with the centre of the handkerchief; and in that case there is no occasion for the plate block to travel on the bars *b b* and *c c*.

Fig. 3 represents a cylinder and its appendages, to be used instead of the engraved plate which we have been describing. The cylinder *k* is in length half the width of the cloth, so that when an impression is given to one half the width of the piece, the hollow engraved cylinder *k* is moved along the mandril *l* to give an impression to the other half width. This cylinder turns on two pivots *m m*, and there are near the ends of the mandril two slots with set screws for fixing stop blocks, that the extent of shifting in the cylinder *r* may be adjusted to the width of the piece on which the impression is to be made.

Fig. 4 represents the rolling press, where *k* represents the engraved cylinder as in fig. 3; *n* the ductor roller, *o* the ink trough, *p* a scraper, or ink distributer, kept up to the cylinder *k* by means of cord *q* passing over pulley *r*, and supporting the weight *s*. *t t t* shows the direction of the endless blanket and piece to be printed, with the guide rollers for conveying it in the proper direction to the pressure roller *u*. The roller *u* is forcibly pressed down by means of a pair of levers, one of which is shewn by *w*, this is joined by the connecting rod *y* to the lever *z*, which supports on the extremity of its long arm a weight as represented in the figure.

EXCAVATIONS.—To G. V. Palmer, of Worcester, a patent for "improvements in machinery for excavating" was granted on the 24th of January, and the specification was lodged in the Enrolment Office on the 24th of July, 1832.

The machinery invented by Mr. Palmer may be described as an excavating cart and plough united; to be worked by horses or other power. The cart wheels are made considerably wider than those in common use, and the interior portion of the ring of each is made into a series of earth boxes, somewhat similar to those of a dredging machine. These earth boxes are made to open

inwards, and also towards the centres of the wheels. Underneath the cart, immediately adjoining each wheel, is placed a plough for raising and turning the earth into the boxes as the cart is moved forwards: the wheel at the same time turning round, brings up the earth and delivers it into the body of the cart. When a sufficient load has thus been deposited in the cart, the ploughs are raised from the ground by means of a lever, and then the cart can be drawn in every respect as a common cart to the place intended for the deposition of the excavated earth, where it is to be unloaded by withdrawing a pair of bolts, which allow the bottom of the cart to fold downwards sufficiently to permit the earth to escape.

There are several parts of this invention which indicate considerable ingenuity on the part of the patentee, and we have no doubt that there are many circumstances where the application of excavating machinery of this kind might be employed to advantage.

Table Fastenings.—To John Sutton Nettlefold, of Red Lion Street, Holborn, in the county of Middlesex, Ironmonger, a patent "for an improvement or improvements in table furniture, applicable to other purposes," was granted on the 16th of February, and the specification was deposited in the Enrolment Office on the 14th of August, 1832.

The nature of this invention is stated to consist in improved forms of construction of the fastenings used for connecting dining tables; which are also applicable to the effecting the junction of window sashes, shutters, the partitions of apartments, temporary platforms, and to uniting in a firm and simple manner any species of work or object having joints or surfaces adapted to receive them.

In order to draw a clear distinguishing line between this invention and other fastenings previously constructed for the same purposes, the patentee has delineated and explained the two leading sorts that were in general use, before the introduction of his improvements. The first is an old contrivance denominated the "forked table fastening," which most of our readers will recognize to be the identical apparatus under their dining tables, when we tell them that the said consists of two rectangular sockets or staples, screwed to the edges of the two opposite flaps, and that into these staples are passed two metallic prongs which are connected together by a handle at right angles to them both. The defect of this plan consists in the prongs being usually made parallel, which renders them incapable of "drawing-up" the joints; and they soon become loose from wear; and when these prongs are a little tapered, although

they then "draw" a little, the extent is limited by the handle being stopped by the staples. The prongs are also *liable to strains*, which spreads them farther asunder, or otherwise cripples them.

The other table fastening alluded to is a recent invention by Mr. Minter, and will be found described in the early part of this volume, which the patentee liberally admits has the merit of great simplicity in structure, and efficiency in drawing-up the joints; he, however, justly observes, that it has two defects from which his arrangement is free; these are, that the handle ultimately becomes *a stop* to the progress of the wedge, and that the *projection* of the hooked staples beyond the edges of the wood renders them very liable to injury, when the separated flaps are moved about.

Mr. Nettlefold's fastenings we will now describe with reference to figs. 1, 2, 3, 4, 5, Pl. XV.; in all of which the same letters of reference indicate corresponding parts wherever they occur. Fig. 1 represents a plan of two metal plates, *a b*, connected at right angles to two wedge-shaped pieces *c d*, as will be understood on reference to fig. 2, which affords an end edge view of those parts as distinguished by the letters thereon. The plates *a* and *b* are screwed down, through the holes exhibited, to the separate flaps of a dining table; which being placed near together as shown by the two dotted lines at *e*, are brought into close contact by a strong "bridge-piece," an elevation of which is expressed by fig. 3. This fastening operates by taking hold of the bridge-piece *f*, and thrusting the tongues *g h* underneath the wedge-framed pieces *c* and *d*, commencing at their narrowest ends, and sliding it towards the widest, when in consequence of the increasing breadth of the wedge pieces they are drawn towards each other, and with them the table flaps to which they are screwed;—thus forcing them into contact in the manner shown by the sketch fig. 4.

It is obvious that the wedge pieces *c* and *d* may either be fixed on the outside of the wood of the table, as in fig. 4, or they may be sunk flush into it, as represented by a longitudinal section of one of the fixed pieces in fig. 5; *d* being in the wedged portion, and *b* the plate screwed down to the bottom of the mortice of the wood *i*; the cavity *k* being left open for the entrance of the tongue, previous to its being slid under *d*.

Although the patentee gives the preference to the fastening just explained, for general purposes, he describes numerous modifications of the principle to show that he anticipates and claims every variation that can be made in it. In all the modifications however, there is this peculiarity, that the bridge connector draws the fixed parts together by sliding *over* or *outside* of them, and meets with *no stop*

to its course, consequently, there is a continually compensating action as a remedy for the wearing away or warping of the joints of the flaps; these may nevertheless at any time be "fresh shot" without taking off the fixed pieces: the latter it will be observed have *no projections* when put on in the manner shown by fig 5; and the bridge connector being very massive, and subject only to a kind of longitudinal pull, is *not liable* to any injurious stains.

Thus has Mr. Nettlefold obviated the defects of preceding inventions, and produced, according to our judgment, exactly the thing wanted in the department of art to which it relates.

THE HYDROSTATIC BED FOR INVALIDS.

We are indebted to Dr. Arnott, the author of the above-mentioned inestimable invention, for the following account of it, which he has prepared for the fifth edition of his "Elements of Physics," now in the press.

"In many of the diseases which afflict humanity, more than half of the suffering and danger is not really a part of the disease, but the effect or consequence of the confinement to which the patient is subjected. Thus a fracture of the bone of the arm is as serious a local injury as a fracture of one of the bones of the leg; but the former leaves the patient free to go about and amuse himself, or attend to business as he wills, and to eat and drink as usual—in fact, hardly renders him an invalid; while the latter imprisons the patient closely upon his bed, and brings upon him, first, the irksomeness of the unvaried position, and then the pains of the unequal pressures borne by the parts on which the body rests. These, in many cases of confinement, disturb the sleep and the appetite, and excite fever, or such constitutional irritation as much to retard the cure of the original disease, and not unfrequently to produce new and more serious disease. That complete inaction should prove hurtful to the animal system, may by all be at once conceived; the operation of the continued local pressures will be understood from the following statements. The health, and even life, of every part of the animal body depends on the sufficient circulation through it of fresh blood, driven in by the force of the heart. Now when a man is sitting or lying, the parts of his flesh compressed by the weight of the body do not receive the blood so readily as at other times; and if from any cause the action of his heart has become weak, the interruption will both follow more quickly and be more complete. A peculiar uneasiness soon arises where the circulation is thus obstructed, impelling the person to change of position; and a healthy person changes

as regularly, and with as little reflection, as he winks to wipe and moisten his eye-balls. A person weakened by disease, however, while he generally feels the uneasiness sooner, as explained above, and therefore becomes what is called restless, makes the changes with much fatigue; and should the sensations after a time become indistinct, as in the delirium of fever, in palsy, &c., or should the patient have become too weak to obey the sensation, the compressed parts are kept so long without their natural supply of blood that they lose their vitality, and become what are called sloughs or mortified parts. These have afterwards to be thrown off if the patient survive, by the process of ulceration, and they leave deep holes, requiring to be filled up by new flesh during a tedious convalescence. Many a fever, after a favourable crisis, has terminated fatally from this occurrence of sloughing on the back or sacrum; and the same termination is common in lingering consumptions, palsies, spine diseases, &c., and generally in diseases which confine the patients long to bed.

"It was to mitigate all, and entirely to prevent some, of the evils attendant on the necessity of remaining in a reclining posture, that the hydrostatic bed was contrived. It was first used under the following circumstances.

"A lady after her confinement, which occurred prematurely, and when her child had been for some time dead, passed through a combination and succession of low fever, jaundice, and slight phlegmasia dolens of one leg. In her state of extreme depression of strength and of sensibility, she rested too long in one posture, and the parts of the body on which she had rested all suffered; a slough formed on the sacrum, another on the heel; and in the left hip, on which she had lain much, inflammation began, which terminated in abscess. These evils occurred while she was using preparations of bark, and other means, to invigorate the circulation, and while her ease and comfort were watched over by the affectionate assiduity of her mother, with numerous attendants. After the occurrence, she was placed upon the bed contrived for invalids by Mr. Earle, furnished for this case with pillows of down and of air of various sizes, and out of its mattress portions were cut opposite to the sloughing parts; and Mr. Earle himself soon afforded his valuable aid. Such, however, was the reduction of the powers of life, that in spite of all endeavours, the mischief advanced, and about a week later, during one night, the chief slough on the back was much enlarged, another had formed near it, and a new abscess was produced in the right hip. An air-pillow had pressed where the sloughs appeared. The patient was at that time so weak, that she generally fainted when her wounds were dressed; she was passing days and nights of uninterrupted suffering, and as all known means seemed insufficient to relieve her, her life was in imminent danger.

"Under these circumstances, the idea of the hydrostatic bed occurred to me. Even the pressure of an air-pillow had killed

her flesh, and it was evident that persons in such a condition could not be saved unless they could be supported without sensible inequality of pressure. I then reflected that the support of water to a floating body is so uniformly diffused, that every thousandth of an inch of the inferior surface has as it were its own separate liquid pillar, and no one part bears the load of its neighbour—that a person resting in a bath is nearly thus supported—that this patient might be laid upon the surface of a bath over which a large sheet of the water-proof India-rubber cloth were previously thrown, she being rendered sufficiently buoyant by a soft mattress placed beneath her—thus would she repose on the face of the water, like a swan on its plumage, without sensible pressure any where, and almost as if the weight of her body were annihilated. The pressure of the atmosphere on our bodies is of fifteen pounds per square inch of its surface, but, because uniformly diffused, is not felt. The pressure of a water-bath of depth to cover the body, is less than half a pound per inch, and is similarly unperceived. A bed, such as then planned, was immediately made. A trough of convenient length and breadth, and a foot deep, was lined with metal to make it water-tight; it was about half filled with water, and over it was thrown a sheet of the India-rubber cloth, as large as would be a complete lining to it if empty. Of this sheet the edges, touched with varnish to prevent the water creeping round by capillary attraction, were afterwards secured in a water-tight manner all round to the upper border or top of the trough, shutting in the water as closely as if it had been in bottles, the only entrance left being through an opening at one corner, which could be perfectly closed. Upon this expanded dry sheet a suitable mattress was laid, and constituted a bed ready to receive its pillow and bed-clothes, and not distinguishable from a common bed but by its most surpassing softness or yielding. The bed was carried to the patient's house, and she was laid upon it; she was instantly relieved in a remarkable degree: sweet sleep came to her; she awoke refreshed; she passed the next night much better than usual; and on the following day Mr. Earle found, that all the sores had assumed a healthy appearance: the healing from that time went on rapidly, and no new sloughs were formed. When the patient was first laid upon the bed, her mother asked her where the down pillows, which she before had used, were to be placed; to which she answered, that she knew not, for that she felt no pain to direct: in fact, she needed them no more.

"It may be here recalled to mind, that the human body is nearly of the specific gravity of water, or of the weight of its bulk of water, and, therefore, as is known to swimmers, is just suspended or upheld in water without exertion, when the swimmer rests tranquilly on his back with his face upwards. He then displaces water equal to his own body in weight as well as in bulk, and is supported as the displaced water would have been.

If his body be two and a half cubical feet in bulk (a common size), he will just displace two and a half cubic feet of water, equal in weight to his body. If, however, instead of displacing the water with his mere body, he choose to have something around or under him which is bulky with little weight, as the mattress of the bed above described,—when his weight has forced two cubical feet of that under the level of the water around, he will float with four-fifths of his body above the level, and will sink much less into his floating mattress than a person sinks in an ordinary feather-bed. It thus appears, that by choosing the thickness of the mattress, and if unusual positions are required, by having different thickness in different parts, or by placing a bulk of folded blanket or of pillow over or under the mattress in certain situations, any desired position of the body may be easily obtained.

"This bed is a warm bed, owing to water being nearly an absolute non-conductor of heat from above downwards, and owing to its allowing no passage of cold air from below. From this last fact, however, less of the perspiration, whether sensible or insensible, will be carried off by the air than in a common bed, and unless the patient can leave the bed daily to let it be aired, it is necessary to lay an oiled silk or other water-proof cloth over the mattress, to prevent the perspiration from descending to be condensed on the cloth below; or to place a blanket below to be changed occasionally; or, finally, to lay under the mattress a layer of cork, cut into small pieces, and so connected as to leave passages between, for any desired degree of ventilation. This bed is, in itself, as dry as a bed can be, for the India-rubber cloth (of which bottles can be made) is quite impermeable to water, and the maker is now preparing cloth expressly for this purpose. Then, as Sir Humphry Davy recommended that his safety-lamp should be double, some persons may prefer a double sheet, to obviate the possibility of accident. Unlike any other bed that ever was contrived, it allows the patient, when capable of only feeble efforts, to change his position, almost like a person swimming, and so to take a degree of exercise, affording the kind of relief which, in constrained positions, is obtained by occasional stretching, or which an invalid seeks by driving out in a soft-springed carriage. It exceedingly facilitates turning for the purpose of dressing wounds, for, by raising one side of the mattress or depressing the other, or merely by the patient's extending a limb to one side, he is gently rolled over, nearly as if he were simply suspended in water; and it is possible even to dress wounds, apply poultices, or place vessels under any part of the body, without moving the body at all; for there are some inches of yielding water under the body, and the elastic mattress may, at any part, be pushed down, leaving vacant space there,

without the support being lessened for the other parts *. Then, with all the advantages which other invalid beds possess, and with those which are entirely its own, it may yet be made so cheaply, that even in hospitals, where economy must prevail, it may at once be adopted for many of the bed-ridden. Mr. Earle, within a few days of seeing the first one, had others made for patients in St. Bartholomew's Hospital, and has been as much pleased with the results of them as of the first. The bed has since been introduced into St. George's Hospital by Mr. Keate, and elsewhere. The author has now seen enough of the effects of this bed, to make him feel it a duty at once to publish a notice of it. With it, evidently, the fatal termination called sloughing, now so common, of fevers and other diseases, need never occur again. And not only will it prevent that termination, but by alleviating the distress through the earlier stages, it may prevent many cases from even reaching the degree of danger. Then it is peculiarly applicable to cases of fractured bones, and other surgical injuries; to palsies, diseases of the hip joint, and spine; and universally where persons are obliged to pass much time in bed. And in all classes of curvature of the spine, either actually existing or threatened, it affords a means of laying a patient in any desired position, and with any degree of pressure incessantly urging any part of the spine back to its place. If used without the mattress, it becomes a warm or a cold bath, not allowing the body, however, to be touched by the water; and in India, it might be made a cool bed for persons sick or sound, during the heats which there prevent sleep and endanger health. There are numerous other professional adaptations and modifications of it, which will readily occur to practitioners sufficiently versed in the department of natural philosophy (hydrostatics) to which it belongs. Before reflection, a person might suppose a resemblanee between it and an air-bed or pillow, calling this a

* The Editor ofthe Register can add his testimony to the perfect accuracy of this statement, having lain upon one of these hydrostatic beds, and experienced that wonderful ease and softness—that absence from all sensible pressure, and the almost imperceptible effort that is required to move or turn about when upon it. He was permitted to experiment upon the utility and advantages it afforded when upon a recent visit to a near relative, at the admirable establishment for the cure of mental diseases at High Beech, near Woodford, instituted and constantly superintended by Dr. M. Allen (author of a valuable book on Insanity, and of various medical, moral, and philosophical works), and of whose establishment the Editor feels it his duty to state;—that it consists of two neat and roomy villas, about a quarter of a mile apart, in connection with sixteen acres of gardens, fields, and pleasure-grounds, quite of the Arcadian order: the site is lofty, in a very open part of Epping Forest, and commands very extensive and picturesque views.—Here, surrounded by a salubrious atmosphere, with liberty to roam apparently unrestrained, with varied amusement, recreation, or employment provided, and parental care, the unfortunate (but yet comparatively happy) patients receive all the benefit which it is possible for the most enlightened benevolence to bestow.

water-bed or pillow; but the principles of the two are perfectly distinct or opposite. An air-pillow supports by the *tension of the surface* which encloses the air, and is therefore like a hammock or the tight sacking under the straw mattress of a common bed, and really is a hard pillow; but in the hydrostatic bed there is no tense surface or web at all: the patient is floating upon the water, on which a loose sheet is lying, merely to keep the mattress dry, and every point of his body is supported by the water immediately beneath it. Te recall the difference here described, and which is of great importance, the bed is better described by the appellation of *hydrostatic bed* than of *water-bed*.

"The author has given no exclusive right or privilege to any person to make this bed. He has hitherto employed the carpenter nearest to him, Mr. Smith, 253, Tottenham-court Road, at the back of Bedford Square, and the manufacturers of the water-proof cloth, Mackintosh and Co., 58, Charing-Cross; but any carpenter or upholsterer may learn to supply them, and he gives free permission to all.

"The preceding paragraphs are intended as much to direct in the choice and use of common beds for the sick, as to announce and describe the hydrostatic bed for the purposes where it may be required. At present the medical attendant often leaves whatever regards the bed to the judgment of friends or nurses; but evidently he who perceives clearly how much the course and events of a malady may depend on the patient's being supported, so that no pain shall arise from local pressure; and as little weariness as possible from the constrained position, will be better able to use any bed to its greatest advantage, and where a choice of beds is allowed to choose the best. There is a bed formed of spiral springs which diffuses the support more than any bed except the hydrostatic bed; and had professional men generally known it, it would have been more extensively used than it is, and would have received modifications of which it is susceptible for medical purposes. It has been long known, but chiefly as a mechanical curiosity or as an object of luxury,—but so little known, that a few years ago an English manufacturer took out a patent for it, believing it a novelty. It is now made by upholsterers generally, and the same principle is applied in the construction of sofas, chairs, and carriage cushions.

"It is one of the many striking facts illustrative of the benefits attending the commercial intercourse of mankind, that Indian rubber or caoutchouc, for many years used only to rub out pencil marks, has become an important article in the manufacture of cloth; and it is pleasing to think that probably one of its most extensive applications will be in the mitigation of human suffering."

OBSERVATIONS ON THE THEORY OF THE FLYING OF BIRDS, &c.

By Lewis Gompertz.

If no animal had ever been seen which could fly, and any mechanic had expressed that he thought the thing possible, he would in all probability have been deemed deficient of common sense. The supporting of the whole weight of an animal on so yielding a substance as air by the mere strength of its wings, has, indeed, something in it so different from what we are generally able to imitate, that it seems almost supernatural, and when the rapidity and ease of the motion be considered, even with an additional heavy burden, as well as the little incumbrance of the wings when not in action, and the elegance with which in birds they are then folded close to the body, admiration cannot fail of being most highly excited.

The means by which flying is performed has been considered by many ingenious inquirers, but I believe in a far more limited and transitory way than its interest would have led us to suppose. The theory held forth is therefore I conceive, with deference, very partially correct.

Birds are supposed to strike the air with their wings fully expanded in a direction in part perpendicular and in part horizontal, which at once is supposed to carry them upward and forward, and in raising the wings for a new stroke to contract them so as to cause but very little resistance. Also, that in order to turn to the right or left they strike with the opposite wing more horizontally. The strength of the wings is thought to be necessarily immense, and it is judged that birds are therefore not only formed much stronger than other animals, but that almost their whole strength is given to their wings, while the other parts of their bodies are very scantily supplied.

The first part of this theory though ingenious, discloses, I conceive, rather a principle on which flying might propably be performed than that by which it is, in the usual way, actually done. It only, I think, requires to look at a large bird which is flying to perceive that it does not act in the way described; the wings move simply up and down, perpendicularly, and as much expanded when returning from the stroke as during the stroke itself; still the bird moves forward. The necessity of getting rid of the resistance of the air in raising the wings, has led mechanics to suppose that birds *contract* their wings in raising them; but when considered that *bats* and *insects* fly without the possibility of contracting their wings, it may be granted that birds may also. Neither do birds appear to move one wing more horizontally in proportion to the position of the body in turning to the right or left, than when going straight forward.

Without, however, pretending to give a circumstantial and perfectly accurate account of the principles of flying, I believe the following contains some of the facts, while others appear involved in some obscurity.

The wings of all flying animals are, in their flying position, stiff *in front*, and *thin* and *yielding behind*. In insects the wings are straight, and when not flying the stiff part is sidewise and outward, while the thin side is inward, but in flying the position is changed, so that the stiff part is in front and the thin part behind. In birds, as their wings are composed of feathers, this mechanism would not do; the pinions therefore instead of being straight from the body, in flying, turn backward, so that the ends of the feathers come behind, and the stiff part before: were this not necessary, the pinions would have been more suitable by being straight, so that the points of the feathers came sidewise. The animal then it appears has nothing to do in order to fly forward, but to move its wings perpendicularly downward, when the resistance of the air causes the hind part of the wings to bend a little upward, thus forming a wedge which acts against the air, and the wings then thus bent by their mere downward stroke, if I am not mistaken, at once impel the animal upward and forward; a small force only being required for the latter. When the animal turns to the right or the left, it strikes harder with the opposite wing, but without sensibly altering the position; by this means the hind part of that wing becomes more bent, and forms a more obtuse angle with the horizon, which causes the animal to turn. A proof that this is the action a bird uses, exists in the fact that when it turns, it elevates the opposite side of its body, and this is because in striking harder with one wing in order to bend the hind part of the feathers more, it necessarily acts also with more upward force on that side. But to this theory a difficulty presents itself, viz. that although the bird may for a few strokes act as described, it could not without some other action continue to do so, (in flying in a circle), because each stroke of the wing would raise that side of the body more and more, till at last the bird would be turned on its back, but probably it re-establishes its balance by degrees by the weight of its legs and the action of its tail, yet all of which may be insufficient to prevent the *temporary* elevation of one side of the body.

The resistance of the air in raising the wings must, it appears, always cause great re-action and impediment to the bird, &c. but which is, it seems, in part prevented by the wings being moved more slowly in the up-stroke than the down. Time, it is true, is thereby lost at the up-stroke, but a small decrease of velocity in the wing causes a great decrease of resistance; which would be in a geometrical proportion to that of the velocity. Besides which, in a bird, the convexity of the upper surface and concavity of the lower, causes, I believe, less resistance at the up-stroke than exists at the down stroke.

Owing to great strength being, it is admitted, required in the wings, much complication in their construction appears to have been avoided; by which means the muscles of the down and the up-strokes are enabled to be very large, so as to act with great force and ease, while the other motions of the wings appear to be made with comparative difficulty, and are seldom used. A bird has little else to do

with its wings in flying, than to move them on their shoulder joint simply up and down, always nearly the same, whether the bird ascends, descends, goes forward, or turns to either side.

When birds want to rise nearly perpendicularly, as they are unable easily to alter the direction of the motion of their wings from the common stroke, they contrive to do it without, and their method is, it appears, by *neutralizing* that force which tends to send them forward, acting at the same time with their wings with great strength. This they seem to accomplish by elevating the front of their body above the hind part, by which means the wings (excepting the bent part) as they in this position, act against the air, tend to send the bird backward, and thus the front and the hind part of the wings counteract each other, leaving the elevating power entire, excepting a slight loss occasioned by the inclination of the body, and the bending of the ends of the wings. The means by which they raise their fore parts above their hind parts appear to be by their tail (which acts as a sort of a rudder), and also by their legs and head, which by being held backward or forward, alter the centre of gravity of the body as it hangs (like a pair of scales) on the wings. Suppose, now, the bird wants to rise, it then, it seems, draws back its legs, and head, by which means, and by the steerage of the tail (the action of the wings becoming before the centre of gravity) the front part of the body is elevated, in which position the bird necessarily is when it rises. When birds wish to descend, they may either reverse the action or simply act with less force.

The legs of birds, in order to balance the body, being required to be carried contracted, would thereby become much fatigued, but for a beautiful contrivance which prevents it. The skin of the legs is for this purpose made loose and detached from the body to the heels (where the tarsus commences), and the bird is able to put its knees farther or shorter into the skin, which is very strong, and forms a kind of a sling, in which the legs hang in various positions without much fatigue.

The wings, having little occasion for complexity of motion, have their chief strength given to their up and down strokes, and therefore essentially differ in their construction from the arms of a man, which have so great a variety of motions to perform, and every one with strength; which causes the power of the different muscles in the arms of a man to be more equally divided. Birds scarcely use their wings at all except for flying, and even in that they scarcely, it appears, deviate the motion of their wings. Yet some birds have a horn on their wings which they use as a weapon, but whether they have much dexterity in its management I am not aware.

From the horizontal position of a bird the motion of the down stroke of the wings is across the body, and is therefore wholly or principally performed by the *pectoral* muscles; but were a man to attempt to imitate the action, his erect posture would cause him to move his arms longitudinally downwards, which would be done by a combination of the *pectoral* and the *latisimus dorsi*, and other muscles, and these though in a degree here counteracting each other;

would, it appears, give him much more strength than he could exert by the *pectoral* muscles alone; therefore the comparative weakness of the pectoral muscles of a man would not be so great a preventive to his flying by the motion of the arms as is generally believed; neither does it seem that his size would be a detriment; as it appears erroneous, that small animals are proportionably much stronger than large ones; though in favour of this idea it is advanced that a flea can jump a distance of 100 times its length, which is far beyond what a horse or a dog could do with respect to its own length; but the reasoning is faulty, as in order for horse or dog to do as much in proportion, they should only jump the same *absolute* distance, because, if to move one pound one inch require the force of one, the force necessary to move 100 pounds one inch would require the force of 100, but this 100 pounds of force would not move the 100 pounds 100 inches. The length of the horse has in fact nothing to do with the question; and it is obvious, that if 100 fleas were attached together without impediment to their motion they could not jump further than one. It has also been held forth that beetles can raise a much greater weight in proportion than large animals, but it must be recollected that their motions are absolutely much slower. Even the reverse of this theory seems to obtain, as a horse can run much faster than a mouse or a flea, (as to absolute distance).

The force requisite for flight though it may be great, has, I conceive, been much over rated, and even less force is I conceive employed by a bird in flying than by a quadruped of the same size in running; the latter employing the whole strength of all its limbs and the former that of only two of them, (though some difference may certainly exist in favor of the whole strength of birds) the legs of birds being unemployed in flying (excepting as a balance) and to which as well as the head, neck, and tail, &c. it must be confessed a very considerable portion of the muscles are devoted. That the strength of the legs of birds is not small may be inferred from their being able to run, climb, swim, and use them for many other purposes; also to their never lying down, and to their sleeping while standing on one leg with the other slung in the skin, similarly to when they are flying. Insects which fly also have considerable power and address in their legs, as appears by their never lying down, by their being able to walk up a smooth perpendicular surface, and even on an inverted horizontal plane, the operation of which appears almost miraculous.

Birds possess an advantage in the smallness of their specific gravity, which may be observed in a duck, &c. about half of which rests above the water without any exertion, yet this is not all profit, as no doubt some strength is sacrificed by it from want of solidity of the parts.

The rapidity of the strokes of the wings of animals depends on their size, large birds make few strokes and insects many, the strokes of the wings of insects being sufficiently rapid to produce a musical tone, and by which the number of their strokes can be easily ascertained.

A bee for instance, produces a note nearly as low as the lowest note of a tenor violin, which I believe makes above 100 vibrations in a second, and this is the number of strokes made by the bee; smaller insects produce a note more treble, the motions of their wings being oftener repeated.

The force necessary to raise or suspend an animal in the air is generally I think misunderstood. It is supposed that if a bird have strength enough to support itself by its wings when extended and acting against the air, it must have strength enough to support itself if the wings acted upon a solid substance and touching it, at a distance from its body similar to about the medium distance where the wing strikes the air (or without allusion to where this precise point may be, but assuming the part where the wing touches air to be a point,) it is supposed that if there were strength enough when acting against the air, there would be more than strength enough when acting against a fixed resistance. This I believe is also a mistake, and that the very yielding of the air (which is the fulcrum) may give the wing the power; in the same way as would result by employing a longer lever, as it would enable the bird to rise a little at a time, whereas if the fulcrum were fixed, if the bird had not strength enough to overcome a certain resistance it could not rise at all.

The absolute force required for suspension in the air cannot it appears be estimated simply by the datum afforded by gravity in the way generally conceived; and however weighty the body might be the force required to suspend it on the air would be infinitely small, provided the leverage were properly proportioned, the weight and friction of the mechanism not being taken in the account. Any weight may be raised upon a fixed fulcrum by a force however small; and upon a yielding fulcrum (such as air) the same thing can be done, but the striking surface requires to be larger or the leverage longer; and according to the surface which the wing presents to the air must the leverage be governed: for instance, if the surface were immense, by which the fulcrum would become almost fixed, nearly the same effect would result as if the wing acted upon a solid body, and if the surface of the wing were very small the same thing might also, it appears, to be produced, by having the lever longer, so that the motion was quicker, but though the long lever would do for the yielding fulcrum, more strength would be required to act by a long lever on the fixed fulcrum. All that is necessary is to have a fulcrum of some sort, stiff or yielding, and in either case allowing nothing for friction and the weight and motion of the mechanism the same thing can be equally well produced.

THE MICROSCOPIC CABINET OF SELECT ANIMATED OBJECTS;

With a Description of the Jewel and Doublet Microscopes, Test Objects, &c. To which are subjoined, Memoirs on the Verification of Microscopic Phenomena, and an exact Method of appreciating the Quality of Microscopes and Engiscopes. By C. R. GORING, M. D. *Illustrated, from original Drawings, by thirteen coloured Plates, and numerous Engravings on Wood. By* ANDREW PRITCHARD. *Octavo.* 246 *pages.*— Whitaker, Treacher, & Arnot.

THE lovers of natural history, as well as students in the proper construction and management of microscopic instruments will derive both gratification and instruction by the perusal of the above-mentioned work. The first part contains minute and interesting descriptions of a variety of curious objects that have either been overlooked or imperfectly described by preceding naturalists; the illustrations to which are beautifully executed. Representations of living creatures that are invisible to mortal eyes, when unassisted by art, are by the delicate pencil of Dr. Goring, and the skilful graver of Kelsall, placed before the reader, as though they were an order of beings many thousands of times larger than their real dimensions. Subjects of this nature occupy about half the volume, or thirteen chapters. The fourteenth chapter is preceded by an explanation of a few optical terms employed in the subsequent part of the volume, which we shall here subjoin for the information of our own readers who may happen to be unacquainted with this interesting branch of science.

"Microscopes may be formed into two grand divisions: first, those in which we look at the object *itself*, as single microscopes, doublets, and other compound magnifiers; and secondly, those instruments, in which we view a magnified *image* of the object, and not the object itself, commonly called *compound* microscopes; but as the term *compound* is equally applicable to doublets, &c., they being composed of two lenses, and as the latter instruments operate on a principle distinct from the former, in this work, those which exhibit an *image* of the object are termed ENGISCOPES, whether reflectors or refractors, and the others MICROSCOPES.

"An Engiscope (compound microscope), consists of two parts, that which forms the image called the object end, or *objective*, being those lenses or metals next the object. The other part, that which magnifies this image, and enables us to view it, called the *eye-piece*, being those lenses or glasses next the eye. In looking through a common engiscope (compound microscope), the observer will probably notice rings of bright

colours around the field of view, and also similar colours around the edges of the object he is viewing. These defects are caused by the decomposition of common white light, and are called *chromatic aberration or dispersion.* The first, viz. the colours around the field of view, are produced by the defects of the *eye-piece*, by which we view the image formed by the object-glass or metal; and the second, viz. those around the edges of the object we view, are produced by the effects of the object-glass itself: when an instrument is devoid of these defects, it is called ACHROMATIC. Again—if you look at the object as before through the instrument, you will observe its outline or edges are not sharp and distinct, but thick and confused: this is caused by the rays from any point in the object, which are spread over the surface of the object-glass, not being collected into a perfect point as they were on the object itself; this defect is called *spherical aberration:* when an instrument is free from it, it is called APLANATIC*.

"If an instrument has neither its cromatic or spherical aberration removed, it is said to be *uncorrected.* To conceal these defects, there is generally a small hole or *stop* put behind the object-glass, &c. This is injurious to the vision, as it prevents a large portion of light from entering the eye, and makes the objects appear dark, and, moreover, will not exhibit their structure: when this is the case, the instrument is said to want *angular aperture*, for ascertaining which see Dr. Goring's Memoirs†."

In the 14th chapter the author informs us that—

"Nearly all the naturalists who have distinguished themselves by their discoveries with the microscope, have rejected the compound interest, with its luxurious field of view, and attached themselves solely to the single instrument. The reason of this preference (previous to the recent introduction of the achromatics) was, that no compound had been constructed, which was *power for power equal* to the single in exploring the structure of objects. The great loss of light in the ordinary compounds, with the consequent absorption of all the delicate tints and colours of an object, make it appear like a coarse engraving in black and white. This, added to the great and sensible dispersion, which envelopes every object seen through them in a false prismatic halo‡, and utterly obliterates all its delicate markings

* "As this term signifies freedom from *error*, it may not improperly include *achromatism*, and in this sense denotes a perfect instrument."

† "For further information the reader is referred to the valuable little volume on Optics, in Lardner's Cyclopædia, by Dr. Brewster. See also the short treatise on Optical Instruments, Lib. Useful Knowledge, No. 13 & 21, which was written by the author of this work, Mr. Pritchard."

‡ "It might be supposed that the coloured fringes about the edges of an object would not lead a naturalist astray, yet in the best *coloured* illustrations we have of microscopic subjects, viz. Ledermuller's, the objects drawn under the compound have the prismatic colours produced by its chromatic dispersion represented in the plates."

and structure, renders this instrument almost useless for investigation."

The " exact method" of ascertaining the quality of microscopes and englescopes by Dr. Goring appears to be one of great practical utility. Mr. Pritchard says it has hitherto been a secret known to only very few persons, and its value may be somewhat appreciated when it is stated that no perfect achromatic microscope has been produced without it; and that profound mathematicians have assiduously employed their talents in the investigation of the conditions necessary for obtaining *achromatism*, and a *planatism*, yet no *perfect* instrument has been produced excepting by the means given in this memoir. We cannot but entertain a high opinion of the practical value of this memoir, when we consider that *effective* achromatic object glasses for miscroscopes owe their existence to Dr. Goring.

STEAM CARRIAGES.

EXPERIMENTAL JOURNEY BY MESSRS. OGLE AND W. A. SUMMERS IN THEIR STEAM-CARRIAGE.

[From the Morning Chronicle.]

MONDAY this steam-carriage passed through Newbury from Southampton to Oxford; it proceeded along the streets at a steady pace, attended by a large concourse of persons. At the Chequers Inn, Speenhamland, it stopped to take in water and coke; the supply of water required was about one hundred buckets. When starting, the coach went off with very considerable speed, and soon left all the pedestrians far behind.

We understand Messrs. Ogle and Summers have been occupied almost four years in their experiments, and have expended 30,000*l.* in bringing their invention to perfection, or rather to that state which leaves only some trifling minor details to be worked out. The chief desideratum in locomotive vehicles and vessels (in mines in our colonies) is a safe and efficient mode of generating steam on scientific principles. Messrs. Ogle and Summers have completely mastered that most difficult point. Their boiler contains the greatest possible heating surface in the least possible space, when in combination with the strongest mechanical form. Their boiler consists of numerous sections, having sufficient connection with each other, constructed of cylinders with air tubes within each, standing vertically, so that a stratum of water is placed between two heating surfaces, the outer surface of the cylinders and the inner surface of the air tube. They allow 13 superficial feet to the horse power, and the boiler in their vehicle

contains 398 feet of heating surface, or thirty horse power. They usually work at the pressure of two hundred pounds on the square inch, so that upwards of nineteen millions of pounds weight are pressing to get loose and yet confined and used with perfect safety. The cylinders are 12½ in diameter, with metallic pistons, of such perfect construction, that the steam has never been known to pass these pistons. The boiler contains upwards of fifty-six thousand rivets, and at the tremendous pressure of three hundred pounds on the inch not a rivet leaks. The joints are all perfectly tight, and the supply of water to the boiler from the tank quite perfect. The form of the carriage is elegant and remarkably commodious, and, we understand, easier than any other vehicle. It differs from the common carriage chiefly in its height, and the cumbrous appearance of the boiler, which is placed behind, and beyond is the blowing machine. Owing to the heavy ironwork being at the lower part of the vehicle, an upset is almost impossible.

On Monday morning this carriage left Millbrook, near Southampton, with 23 persons and their luggage, and proceeded towards Oxford. The first 12 miles, celebrated for the hills, were cleared in one hour and ten minutes without pressing the vehicle to its speed. The coach then proceeded towards Whitchurch with great velocity; but before it reached Sutton Scotney it was found that the coke, which had been sent to different stations, consisted of little bags instead of sack, and therefore, fuel was necessarily waited for, or the whole distance would have been cleared in less than five hours. The road is known to be very hilly and rough, and to be perhaps the most trying which a steam-coach could be run on. Notwithstanding, the loftiest hills were surmounted with the greatest facility; that from Whitchurch was ascended at full ten miles an hour. At intervals, the coke being consumed, coals were used, which caused a stream of smoke; but, when coke is burnt there is no appearance of smoke. The want of coke, and the illness of Mr. Summers, induced the party to stop at Abingdon, having cleared upwards of twelve miles an hour when supplied with fuel, and which speed could have been considerably accelerated. The strength of the machinery and the perfect command over the power was completely proved by the fact, that at the summit of a very long and steep hill the drag-chain failed, and the vehicle rushed forward and attained the terrific speed of fifty miles an hour, but was steered with accuracy and safety. It is Messrs. Ogle and Summers' intention to remain several days at Oxford, as they have business to transact, and are desirous of trying some experiment in detail, which experience alone can teach; they have also found that the only part of the machine not made by themselves, the crank axle, has shown some symptoms of weakness in the most unexpected part, arising from culpable neglect, and still more culpable concealment, of the workmen who made it; the necessary strength will be given to it, and the vehicle will then procoed on its destination, through Birmingham and Liver-

pool. In this experiment there has been no avoiding of difficulties—a hilly, rough, and winding road has been selected, and traversed with safety and velocity. The boiler is found to be most efficient, and perfectly tight; the cylinders large enough; the machinery so well put together that even a rush of fifty miles an hour has not started one bolt, nor broken a single screw: the springs of the carriage body have been strengthened, as so many persons clambered on it as to overweigh them. Everywhere the travellers were well and kindly received, and willingly supplied with water. The vehicle entered Oxford in fine style, ascending, at about eight miles an hour, St. Aldate's, and turned into the gateway of the Star Inn. Several ladies accompanied the party, which consisted of the inventors, Messrs. Ogle and Summers, and their friends.

AMERICAN PATENTS.

For an improvement in the making of Pasteboard or other Paper. FREDERICK A. TAFT, *Dedham, Norfolk county, Massachusetts, July* 20.

THE pasteboard or paper alluded to, is, we suppose, intended for sheathing, as it is to be saturated with pitch or rosin, and it is the new mode of doing this which forms the subject of the present patent. The pitch or rosin is to be finely powdered, and mixed with the pulp of which the paper is to be made. The paper, after being dried, is heated, and passed between hot rollers, which renders it compact.

For an improved Truss for Hernia, called the "Gum Elastic Truss." JOHN J. HEITZLEMAN, M. D. *city of Philadelphia, July* 20.

THE principal improvement here claimed is the forming of the pad of gum elastic, without employing any covering, thereby promoting cleanliness, as this material is not absorbent, and is therefore kept clean with perfect ease. The strap which goes round the body is furnished with spiral wire springs, and there is some novelty in the adjustment of the metallic plate of the pad to the steel spring. This, however, has already been so varied, that much improvement is not to be expected.

Judging from the matter before us, we have no doubt that this truss is altogether a good one.

For making Lamps of various descriptions and forms out of Wood. JOSEPH H. MATHER, *Saybrook, Middlesex county, Connecticut, July* 20.

THE drawing and model of this lamp, represent one of the ordinary form, turned entirely out of wood. The only metallic part

about it, is the plate and tubes through which the wick passes. The cavity or chamber for oil is to be coated with glue, white lead, varnish, or some other material which will resist the oil or other fluid to be burnt.

The claim is to the application and use of wood in the construction or manufacture of lamps.

Such lamps will undoubtedly answer the intention very well, as the heat from the wick will never affect the wood injuriously; and when persons become tired of burning oil in them, they will serve to aid in kindling their fires.

For manufacturing Potash from Wood Ashes. EPHRAIM PEARCE, *Lincklaen, Chenango county, New York, July* 20.

LEACHES are to be prepared by placing sticks, straw, and quick-lime, in the usual manner. They are not to contain more than six bushels of ashes, which must form a stratum of from eight to fourteen inches in thickness. Forty-five gallons of water, containing six pounds of salt, are to be heated to near the boiling point, and half a bushel of unslaked lime is then to be thrown in, which will immediately produce boiling. A bushel of ashes is to be boiled in another kettle with six gallons of water. A bushel of ashes is then to be put into the leach, and upon this three gallons of the boiling lime-water are to be poured and allowed to soak in. Ashes are then to be added, a bushel at a time, with six gallons of the lime-water after each, until the intended six bushels are in the leach. The remaining lime-water is to be poured on, six gallons at a time, allowing it to disappear between each pouring.

Three gallons of cold water are then to be put into the kettle of boiling ashes and water, when a quart or two of slaked lime, and a pint, or less, of salt, are to be sprinkled on; after removing the coals, &c. by skimming, six gallons of this water are to be put into the ley kettle. The remainder, with the ashes, is to be put into the leach; cold water is afterwards to be poured on the leach until the strength is out. This leached liquid is to be put into the ley-kettle containing the above-named six gallons, and the boiling is then to be effected in the ordinary way; which, the patentee says, will at once produce the best quality of potash. He adds, that ashes, which, worked by the ordinary process, will produce one ton, will, by his method, yield *more than two tons.*

We have been at some pains to give the whole process, by which the patentee says he produces a result so extraordinary, as we are altogether unable to discover in it any thing to justify the assertion; nor are we prepared to believe, that manufacturers of potash have hitherto been in the habit of throwing away more than one-half of that which is contained in the wood-ashes.

For a machine for preparing Mortar for making Bricks. Oran W. Seeley, *Williamson, Wayne County, New York, July* 20.

This machinery, in its general structure, resembles some others now in use for the same purpose. A circular trough is prepared into which the clay is to be put. A horizontal shaft, working upon an upright in the centre of the trough, when forced round, causes wheels to run over the clay, the wheels having a traversing motion to and from the centre. The arms of the horizontal shaft have each a screw cut upon them, these work in the hubs of the wheels, and cause them to traverse; one of them is a right and the other is a left-handed screw; in consequence of which, both the wheels recede from and approach the centre at the same time. Each wheel, instead of having a single rim, has four rims, or sets of felloes, supported by spokes from one common hub, the advantage of which is manifest.

The claims are to the right and left-handed screws, and to the particular construction of the wheels.

For an improved Metallic Mould for casting Butt Hinges. J. Kendall, Jun. *Watertown, Middlesex county, Connecticut, July* 21.

A metallic mould suitable to receive the metal, is made in two parts; these are to be fixed opposite to each other within double levers, which open and close like tongs. The moulds are held together, the metal poured in, and on liberating them, a spring between the levers separates the two parts, and a pin forces the cast piece out before it has time to cool, so as to harden or break.

For a Machine for Cutting Dye Woods. Merrit Hurd, *Augusta, Oneida county, New York, July* 22.

There is a part of this machine, which, in the specification, is called a cylinder; but it is in fact the frustrum of a cone: one of its ends is six, the other ten inches in diameter, and eight in length. This part is made of cast iron, about five-eighths of an inch thick, and with a head or bottom to the smaller end; through this passes a horizontal shaft, by which it is made to revolve. A longitudinal mortice, like the mouth of a plane, is made to receive the iron which is to cut the dye wood, the chips from which pass through to the inside of the cone, and fall out from its open end. There is a rest provided to sustain the wood to be cut; and a weighted arm upon the shaft, to operate as a fly wheel, to give momentum to the cutter.

For an improved Corn Plough. NATHANIEL ETHRIDGE, GEORGE HEATH, *and* IRA GLYNN. *Little Falls, Herkimer county, New York, July* 23.

THIS is a plough, which consists of several parts, which are made to shift, in order to adapt the instrument to the respective purposes which it is designed to answer.

When the plough is used for ridging and hilling, it has a mould board, which is double, throwing the earth equally each way, and a chip with double wings. There is also an instrument called a drag, which is sometimes connected to the plough by suitable irons. This is used, for example, in the first hoeing and weeding; the mould board being removed, but the share and chip remaining in their places. The drag operates as a harrow, or rake; it consists of two bars of iron, standing obliquely to each other, their wider opening being towards the plough, and furnished with teeth which drag upon the ground.

LIST OF NEW PATENTS SEALED.

SPINNING.—To J. Wordsworth, of Leeds, machine-maker, for improvements in machinery for preparing, drawing, roving, and spinning flax, and other fibrous materials.—Dated 26th July, 1832. Specification to be enrolled in six months.

PENS.—To J. J. Parker, late of Sheffield, but now of Birmingham, gentleman, for improvements in fountain pens.—26th July. Six months.

PRESSES.—To M. Berry, of 66, Chancery Lane, engineer, for improvements in the construction of presses. Communicated by a foreigner residing abroad.—26th July. Six months.

MOTION.—To P. N. Hainsslin, of Duke-street, St. James's, architect and engraver, for a machine for giving motive power —26th July. Six months.

TEA-URNS.—To W. E. Wright, of Regent-street, Westminster, gentleman, for improvements in the construction of tea and coffee urns.—4th August. Six months.

CLOTHES BUTTONS.—To J. Christophers, of New Broad-street, London, merchant, for improvements in clothes buttons.—4th August. Six months.

WINDLASSES.—To B. C. Tyzack, T. S. Dobinson, and J Robinson, all of North Shields, for improvements in windlasses or machinery for winding up cables.—4th August. Two months.

ROPE.—To J. Crawhall, of Newcastle upon Tyne, ropemaker, for an improvement in the manufacture of flat rope, such as is used in mines, to extend to all the colonies and plantations abroad.—8th August. Two months.

INSTANTANEOUS LIGHT.—To W. Newton, of the Office for Patents, Chancery-lane, London, for an improved apparatus for producing instantaneous light. Communicated by a foreigner residing abroad. To extend to the colonies and plantations abroad.—10th August. Six months.

BUTTONS.—To T. W. Ingram, of Birmingham, die-sinker, for an improved method of manufacturing buttons.—15th August. Six months.

STEAM-CARRIAGES.—To W. H. James, of Thavies Inn, London, engineer, for improvements in the construction of steam-carriages.—15th August. Six months.

PATENTS ENROLLED BETWEEN 10TH AUGUST, AND 10TH OCTOBER, 1832.

Particularizing the Offices in which the Specification may be inspected, with the Dates of Enrolment.

WARMING AND COOLING.—To Charles Augustus Busby, of the Wick Road, in the parish of Stove, Brighthelmstone, in the county of Sussex, Architect and Engineer, a patent for "an improved method of producing the circulation of fluids through pipes, cisterns, or other vessels, applicable to the warming or cooling the interior of buildings, and to other purposes," was granted on the 15th of May, and the specification was deposited in the Petty Bag Office on the 14th of July, 1832.

The nature of the invention and the manner in which it is to be performed, we shall give in the words of the patentee.

"My improved method of producing the circulation of fluids, whether hot or cold, through pipes, cisterns, or other vessels, consists in applying external mechanical force generated by a current of smoke or air acting in an apparatus similar to a smoke-jack, without reference to the direction or position of such pipes or vessels in which the fluid is contained, whether upward, horizontal, downward, or oblique, in which the said pipes, cisterns, or other vessels, may be extended or placed with respect to the level of that part of the apparatus, at and by which the said circulation is caused or created, and the contrivance which I have invented and applied to employ the said mechanical force to cause or create the said circulation, consists as follows:—

"I provide a cistern or boiler, (for which a cylindrical shape is best), and pierce two holes in the circumference near the bottom, and fix a pipe water-tight, through one of the said holes, so as to enter and project within the said cistern or boiler, and so that the open end so projecting within shall reach to, or near to, the centre of the cistern or boiler near the bottom. I extend the said pipe externally from the said cistern or boiler, in any direction, through any building, vault, ship, or carriage, and to any length upward, horizontally, downward, or obliquely, that may be required; and then I bend the said pipe and extend it back again in any required direction, upward, horizontally, downward, or obliquely, so that its other open extremity shall just reach to the other opening in the said cistern or boiler, into which opening I fix (water-tight) the said other extremity, so as that it shall not

project at all, or as little as possible, within the said cistern or boiler, and I then fix a circulator, constructed and fixed like the wheel of a winnowing machine, on a perpendicular axis within the cistern or boiler, with its centre or axis as nearly as possible over that end of the pipe which reaches to, or nearly to, the centre of the cistern or boiler, and I make the axis of the said circulator to rise above the cistern or boiler, and to be mechanically connected with, or terminated by, a wheel similar to a smoke-jack wheel, so as to fit it to have a rotary motion imparted to it through the agency of the said smoke-jack wheel, by the mechanical force of a current of smoke or air as may be most convenient.

"If the said pipe before described be made to rise above the cistern or boiler, the top of the boiler should be closed water-tight, and the axis of the circulator to be made to pass through a stuffing box in the top, to prevent the escape of fluid. If now the cistern or boiler, and the pipe be filled with fluid, which filling may be performed through an opening to be made for that purpose in the upper part of the system consisting of the said pipe, cistern, or boiler, above mentioned, and the circulator be made to revolve by the application of the mechanical force of a current of smoke or air as aforesaid, it will impress upon the fluid within the cistern or boiler a rotary motion, the centrifugal force of which revolving fluid will so act against the fluid in the pipe aforesaid, as to cause the fluid to circulate through the said pipe, so as to run out of the cistern or boiler into the pipe at that end of the pipe which reaches only to the circumference of the said cistern or boiler, and to run into the cistern or boiler from the said pipe at that end of the said pipe which projects within the said cistern or boiler to the centre, or nearly so, of the said cistern or boiler.

"If hot fluid be thus made to circulate through a pipe extended as aforesaid (which pipe may, if required, be enlarged at any part or parts into a cistern, or cisterns, or vessels having any other name) it may be used to impart heat to the interior of any building, vault, ship, or carriage. Or, if cold fluid be thus made to circulate it may be used to abstract heat from the interior of any building, vault, ship, or carriage; and if the whole, or any part of the said pipe, or any of its enlargements, into cisterns, or other vessels, as aforesaid, be made to pass through any other fluid, or through any solid or other body, the fluid contained within the said pipe and its enlargements (if any) as aforesaid, may, if required, be made to communicate heat to, or to abstract heat from the said other fluid, solid, or other body, or to be itself

cooled or heated as may be required according as the temperature of the circulating fluid may be arranged to be above or below the temperature of the said other fluid, solid, or other body. The mechanical force required to produce a velocity of circulation sufficient for the purpose of communicating or abstracting heat, as above described, is so small, that a fire placed beneath or about the cistern or boiler, containing the circulator sufficient to heat the fluid therein contained, will produce a draft through the chimney or flue carrying off the smoke from the fire, if the said chimney or flue be of proper height and dimensions, sufficient to impart to the smoke-jack wheel, if properly fixed in the said flue, and connected as aforesaid, or in any other convenient, mechanical, and workmanlike manner, with the circulator aforesaid, such a motive power as to cause the necessary rotation of the said circulator as aforesaid.

" And I declare such application of a smoke jack-wheel, in combination with the circulator as aforesaid, to be my invention, whether the said smoke-jack wheel be moved by smoke or by a current of air produced in any way whatever.

" And I also declare as my invention the application of a common alternating or other pump, or any modification or multiple thereof, such pump being actuated by a crank, or other mechanical contrivance moved by a smoke-jack wheel, as aforesaid, and being to be used in lieu of, or as a substitute for, the said circulator, so as to cause the circulation of fluids through pipes, cisterns, or other vessels, for any of the above purposes, which application may be effected by fixing and extending the said pipes, cisterns, or other vessels, so as to constitute, in effect, one united, continuous, and simultaneous discharging and supplying pipe to such pump, or any modification or multiple thereof; although I consider such application of a common alternating, or any other pump, or any modification or multiple thereof, in combination with a smoke-jack wheel, to be in most cases very inferior in point of utility and convenience to the use of a circulator as above described.

" To avoid the use of a stuffing-box, which will often be found inconvenient where the pipe of circulation, or its enlargement, is carried above the cistern or boiler, a pipe of appropriate diameter, fixed water-tight in the top of the boiler, may be carried up from a hole to be made for that purpose in the top of the said cistern or boiler, to a height somewhat exceeding the extreme height of the said pipe of circulation and its enlargements, if any;

and the axis of the circulator may be prolonged from the cistern or boiler, through and above the said pipe so carried up, and the communication of mechanical force to the said axis be made above the said pipe in manner aforesaid; the axis of the circulator and smoke-jack wheel is to be retained in its proper position in any convenient manner familiar to the working mechanics. And in all applications of the apparatus above described, and in any of its modifications, provision must be made for the escape of air or other elastic fluid which might otherwise lodge within any part of it, and also to allow for the expansion and contraction of the apparatus itself, and of the fluid contained in it, arising from any variation of temperature, by the same means as are now commonly practised in other apparatus used for similar or analogous purposes.

"And I also declare, that in all cases the actual and relative magnitudes and forms of the cistern or boiler, and fire-place or furnace, and of the circulator and smoke-jack wheel, and of the mode of connecting the circulator and smoke-jack wheel, and the diameter, shape, length, and direction of the pipe of circulation, the dimensions of the enlargements therein, as aforesaid, the height of the chimney or flue to carry off the smoke from the fire-place or furnace, and the selection of the materials of which the whole or any part of the entire apparatus, or any of its appendages, is to be constructed, must depend upon the circumstances of the case under which this invention is required to be applied; and which magnitudes and forms, modes of connecting, diameter, shape, length, direction, dimensions, height, and selection of materials, must therefore be determined by the judgment of the person making use of it.

"Having now described the nature of my invention, and the manner in which the same is to be performed, I would have it understood that I lay no claim to the various parts herein described, which, separately, are well known and in use; neither do I claim the circulation of fluids for the purpose of conveying heat for heating buildings and other purposes, or for abstracting heat therefrom: but what I claim as my invention is the combining the smoke-jack (actuated as aforesaid) as a motive power, with a wheel, or circulator, or pump, for the purpose of producing a circulation of fluids for carrying heat to buildings, and other purposes, or abstracing heat therefrom, as above described.

Description of the Drawing, (Plan C.)

A. Common fire grate.

B. Boiler, with circulator within it.

C. Smoke-jack wheel, fixed on the upper end of the axis of the circulator.

D. Descending hot-water pipe.

E E. Cistern or ornamental vase kept full of circulating hot water by the descending hot water pipe.

F F. Ascending pipe by which the water is returned to the boiler to be re-heated.

G. An upper apartment.

H. A lower apartment.

The arrows show the direction of the circulating water.

Remarks by Patentee.—" To prove the efficacy of his invention, Mr. Busby has had an apparatus on his principle fixed on the premises of Mr. Eckstein, ironmonger, in Holborn; and on the 9th of August, a numerous meeting of engineers and gentlemen of science took place to witness its performance. The furnace is situated in a workshop on the second floor, and the heated water, *urged by the circulator*, passed through inch pipes to a receptacle in the open shop on the ground floor, having descended 21 feet *below* the furnace. The experiment succeeded completely, and gave universal satisfaction.

" Mr. Busby considers his invention of general application, for besides forcing the hot water downwards, an object never yet accomplished, he causes so rapid a circulation in ascending and level pipes as to be enabled to employ tubes of much smaller bore than are now used. He can besides cause the water to ascend and *descend again* about doors and windows, pass *beneath* floors, and in short carry his pipes in any direction whatever, without sensibly impeding the circulation of the hot fluid."

WHIP-STICK.—To Joseph Alexander Taylor, of George Street, Hanover Square, London, a patent for "an improved whip-stick or cane, to be used when riding," was granted on the 5th of June, and the specification was deposited in the Enrolment Office on the 3rd of August, 1832.

The object of this invention is to provide the rider with the means of keeping his horse free from flies and other troublesome insects while under the saddle; and this the patentee proposes to effect by the addition to his whip-stick of a tuft, tail, or tassel,

made of horse hair, which tail, when not in use, is deposited within the stick made hollow for the purpose of containing it. This is the invention; and the " manner of carrying the same into effect," according to legal slang, is by weaving the usual exterior of a whip-stick over a metallic tube of length and thickness to constitute a whip-stick of the ordinary dimensions. Within this is fitted, loosely, that it may move freely, a short piece of tube to contain the ends of the horse hair constituting the artificial tail. The hair is to be secured into the short tube in the same manner that the hair of a shaving brush is secured into its handle. One end of this hollow portion of whip-stick is secured to a solid elastic piece which terminates in a riding whip of the common construction, and into the other end is screwed a small ring or hoop to prevent the small tube from escaping when the tail is used. For the purpose of drawing the tail into the hollow stick, a string is provided which passes out at a small hole at the upper end of the hollow part, and on each side of the hole through which the string passes a pulley is placed to facilitate its motions. Instead of this line and pulleys, it is stated, a piece of metal may be attached to the small tube, of sufficient weight to draw in the tail when it is held vertically. The tail must never be drawn so far in that the exterior ends of any of the hairs shall pass the ring at the end of the stick, otherwise the ring will prevent its passing out again with facility.

To transfer the horse's tail from the end of his rump to the end of the rider's whip-stick may be a good plan, but we confess ourselves so much cockneyfied, and so little conversant with the equestrian profession, as to be unable to see clearly the advantages of the substitution.

WARMING AND VENTILATING.—To John Silvester, of Great Russell Street, in the county of Middlesex, Engineer, a patent for " certain improvements in apparatus for raising the temperature of air to warm and ventilate buildings," was granted on the 5th of June, and the specification was deposited in the Enrolment Office on the 3rd of August, 1832.

The common methods of heating buildings by means of hot air stoves had been much and justly complained of, from the salubrity of the air being frequently injured, by its coming in contact with the surface of a stove comparatively small but intensely heated; and to remedy this evil, the late Mr. Silvester introduced cockle stoves, first in the Infirmary of Derby, and

afterwards in many other places, with large heating surfaces that they might be sufficient to heat moderately a large quantity of air, but not to be heated so high as to injure any portion of it: and thus was obtained an extensive ventilation by air moderately warmed. Still, however, stoves of this kind, without considerable care and skill on the part of the manufacturer, as well as considerable attention on the part of the fire-men, were liable to become over heated, and at times to deteriorate the air; and to obviate the possibility of this defect seems to be a principal object with the present patentee.

He proposes, in the first place, to lower the fire-grate till the bottom bars are on a level with the surface of the floor of the room in which it is placed. The fire bars are prolonged and widened to touch each other in front of the fire so as to form a hearth. They require no fastening into their places, but simply to be laid upon appropriate bearings at each end. There are grooves made on the under sides of the fire bars, for the admission of fresh air for supporting of combustion of the fuel within the grate, and for the escape of hot air into the room. It is stated that the bars may be either made of equal lengths, to constitute a rectilineal hearth, or of different lengths, to constitute a curvilineal one, at pleasure. When the ash pit, which is situated below the fire, in the usual manner, requires clearing out, a few of the fire bars are to be removed, which can be effected with facility, as they are not made fast to any thing.

Mr. Silvester proposes, in the second place, to surround at least three sides of his fire with a vessel containing water, and upon the exterior of this water-vessel, he causes a large quantity of cold air to impinge, that its temperature may be elevated sufficiently to communicate the required degree of heat or ventilation to any adjacent apartments to which it may be conveyed. For the purpose of conveying the cold air to, and the heated air from, the water-vessel, the patentee proposes to employ apparatus of the same description as that employed with the hot air cockles invented by his father.

SPECTACLES.—To George Solomons and Elias Solomons, of Bedford Square, in the parish of Stepney, in the county of Middlesex, Opticians, a patent for "improvements in preparing certain transparent substances for spectacles and other useful purposes was granted on the 16th of February, and the specification was lodged in the Enrolment Office on the 16th of August, 1832.

This invention, which is said to be the communication of a foreigner residing abroad, consists in the application of amber to optical purposes. Of this material the patentees propose to manufacture lenses for spectacles and other useful purposes; and this constitutes the important feature of the invention: in the specification is given, however, a very minute detail of the manner of selecting, slitting, paring, grinding, and polishing the amber lenses, with every particular respecting the different tools to be employed in these several processes.

The amber is first to be inspected for the purpose of rejecting such pieces as may be discovered to have specks or blemishes to injure its refractive power or its transparency. The exterior of the piece selected is then to be removed with a chisel, and then a second inspection is to take place, with a view to its being cut into such lenses as may keep out any blemishes which may now be discovered in the piece. The amber is then to be slit by a lapidary's machine into pieces of appropriate thickness, and each piece is to be shaped by chiseling and grinding till it approaches nearly to the required form. Two cast iron tools are now to be prepared, the one made concave and the other convex, with a curvature to correspond with the intended focal length of the lenses to which they are to be applied. The tools are to be ground together in the usual manner in order to produce perfect uniformity and correctness of the surfaces of the tools. One of the tools is then to be put upon the mandril of a lathe, so arranged as to run in water supplied with finely powdered emery. To the concave tool is to be applied the convex lense, and to the convex tool is on the contrary to be applied the concave lense. The lenses are to be polished by linseed oil and the charcoal of the poplar tree, applied with the cast iron tool covered with fine woollen cloth, and finished by the application of putty, of tin, or else whitening mixed with soft soap and spirits of wine.

Planing Machine.—To Alexander Beatie Shankland, of Liverpool Street, in the city of London, a patent for "a new method of cutting, working, and planing wood, minerals, and metals, by means of machinery," was granted on the 23rd of February, and the specification was lodged in the Enrolment Office on the 21st of August, 1832.

This invention, which is said to be the communication of a foreigner residing abroad, as described in the specification, is principally applicable to the planing of flooring boards; but it

is stated, that with certain modifications it can be used for planing or ornamenting with mouldings, &c., boards, or stones, or soft metals for other purposes.

Upon a stage or appropriate framing, are placed two pair of drawing rollers, the lower roller of each pair being furnished with a spur wheel on the end of its axis, and the motions of these two spur wheels are united by means of an intermediate wheel, which transfers the action of the first mover from the one to the other. The upper roller of each pair is pressed forcibly down by means of a lever and weight, so as to keep the board to be planed in close contact with the lower rollers, which are slightly fluted that they may not turn round without drawing forward the board. Between the two pairs of drawing rollers, and immediately over the board to be planed, is placed a rotatory cutter, similar to that represented by fig. 1, Pl. XVII., where *a* shows the axis of the cutter, *b b* two projecting angular pieces to which the cutting tools *c c* are fixed by means of binding screws; *d* is a brass guage for setting the edges of the cutters to the same distances from the axis of motion, after having been removed for sharpening. The cutter is put into rapid rotation with its altitude adjusted to the intended thickness of the board, which being passed under it by means of the drawing rollers, is rendered perfectly smooth and of uniform thickness. The cutters are to be made with two or three or more arms, according to the work to which they are to be applied, or according to the intended speed of the the cutter axis. When the boards are to be grooved on one side and tongued on the other, a pair of horizontal cutters are to be employed in addition to the planing cutter, and these are adjusted in altitudes to correspond with the different thicknesses of boards, and also as to distances to correspond with the different widths of boards. The cutting tools of one of these horizontal cutters is made with a notch in its middle to produce the tongue on the edge of the board, and the other is made with its middle projecting, to produce the groove on the other side of the board: And thus the board is completely finished for laying the floor by being passed once through the machine.

There are adjustible guides and a check, forced up by a spring, for keeping the board steady to its place while approaching the cutters, and two grooved adjustible guides, exactly to fit the board, for keeping it steady after it has passed the cutters. When the apparatus is to be employed in moulding or producing

ornaments, the cutting tools must be shaped to produce the ornamental form required.

LACE MANUFACTURE.—To George Freeman, of Tewkesbury, in the county of Gloucester, Lace Manufacturer, a patent for "improvements in machinery for ornamenting and producing devices upon lace net," was granted on the 22nd of February, and the specification was lodged in the Enrolment Office on the 22nd of August, 1832.

The intention of this invention is to obviate the employment of separate spotting threads in the manufacturing of ornamented laces net: and this is proposed to be effected by producing such motions on the ordinary spotting bar of lace machines of the usual construction as will render it capable of taking up at adjusted distances so many of the warp threads as may be required for spotting or ornamenting a piece of lace under the operation of manufacture. When the spot or ornament is completed the thread is again returned into its place, and used as a warp thread as before. By this arrangement will be saved, not only the additional thread required for spotting, but also the process of cutting away the loose threads which extend from one ornament or spot to another in lace manufactured in the ordinary manner. The saving of the threads is stated by the patentee to be 20 in 120; he supposes 100 warp threads to require 20 spotting threads, which are dispensed with by his plan of ornament. The additional motions are communicated to the spotting bar by means of a series of wheels, differently indented, on their perepheries placed upon an axis about four inches long, and kept apart from each other about three quarters of an inch by means of washers.

The above is one of those inventions in which we are compelled to limit our account to a general outline of its object and nature, without detailing its construction, which, to be fully understood by the general reader, would require many drawings, not only of the invention of the patentee, but of all the parts of a lace machine to which they are applicable.

SODA WATER.—To Frederick Collier Bakewell, of Hampstead, in the county of Middlesex, Gentleman, a patent for "certain improvements for machinery or apparatus for making or manufacturing soda water, or other aerated waters or liquids,"

was granted on the 8th of March, and the specification was lodged in the Enrolment Office on the 8th of September, 1832.

The apparatus proposed to be used by this patentee, for the manufacture of soda water, and other aerated waters, is represented by fig. 2, Pl. XVII. where *a a* shews an external casing of a cylindrical form, with spherical ends, made strong enough to resist a pressure of several atmospheres; *b* is a partition about two thirds from the top of the vessel, separating it into two parts. The bottom part *c c* is a receptacle for the chalk, or other suitable material, and water from which the carbonic acid gas is to be generated; *d* is a vessel containing diluted sulphuric or muriatic acid, which passes out in small quantities, as required, at the aperture *e* into the vessel *c*. *f* is a guard, to prevent the aperture *e* from being choked up. *g* is a pipe, of the form of a truncated cone inverted, being about an inch in diameter at the bottom, and about two inches at the top. This pipe is fitted into an aperture in the partition *b*, and is closed at the top; its object is for the ascent of gas as it is generated. The gas passes from thence down the pipe *h* into the lower part *i* of a cylindrical vessel *k*, and through a small aperture, the tenth of an inch diameter, or through several apertures, not exceeding in area one of the tenth of an inch diameter, through the partition into the upper part of the vessel *k*. This vessel, which is denominated the washing vessel, is furnished with two shelves sloping in opposite directions, near its top, to detain the gas longer in its passsage through the aperture *l* to the pipe *m*, which is furnished with a perforated rose head *n*, for distributing the gas as it escapes into the water, to be impregnated, contained in the vessels *o o*. *p* is a stop-cock for drawing off the impregnated water as required. *q* is an aperture for the introduction of the chalk and water, *r* is one for the introduction of the acid, and *s* is one for the introduction of the water to aerated. To all of these apertures there are screwed caps, to stop them securely after the respective vessels have been charged. *t* is one of two pivots on which the apparatus swings. When the chalk and acid receptacles are to be supplied with those ingredients, the apparatus is to be turned on its pivots to a horizontal position, with the aperture *r* upwards, and a funnel or hopper with a bent stem is to be employed in filling the vessel *c c*. *n* is an end view of a pendulum or agitator, of the form of an arch of a circle, extending across the bottom of the vessel and suspended at its two extremities; one of the suspension wires is shown in the drawing.

The apparatus having been charged as above described, is to be put into vibration on its pivots, by which the chalk and water will be effectively agitated by the motion of the pendulum, while a small portion of acid will escape from the vessel *d* into the vessel *c*, to keep up the generation of the gas as it passes off to the water in *a*, which will, at the same time by the vibration of the apparatus, be thoroughly mixed with the gas as it escapes through the rose *n*.

The patentee claims generally the arrangement of the apparatus as described, by which the acid is gradually poured out as required, and by which the generating gas apparatus, and the impregnating apparatus, are enclosed in the same vessel.

ROTATORY STEAM ENGINE.—To John Ericsson, of Liverpool, in the county palatine of Lancaster, Civil Engineer, a patent " for an improved engine for communicating power for mechanical purposes," was granted on the 9th of February, and the specification was enrolled in the Enrolment Office, on the 9th of August, 1832.

The subjoined account of the above-mentioned engine we extract from the organ of the patentee; the " Mechanics' Magazine," although it differs in some respects from the enrolled document which we have carefully perused. We have adopted this account of the " *latest wonder*" for several reasons; first, that the patentee may have no ground for saying that we have misrepresented his invention, which he has formerly been prone to; second, that the engine should appear with all the improvements that may recently have been effected by the invention; and third, have all the benefit of the meretricious charms bestowed upon it by the elegant dressing of the Editor of the M. M. whose abilities as a writer we have always admired, however much we may have differed from him in points of mechanical science.

In the patent which Mr. Ericsson has taken out for this invention, he designates it as " an improved engine for communicating power for mechanical purposes;" and this generality was perhaps necessary, since, though it promises to be of most importance in connection with steam, it may be worked by any other gaseous or fluid power, as air, water, &c. The specification describes it more particularly, as consisting of a circular chamber, in which a cone is made to revolve on a shaft or axis by means of leaves or wings, alternately exposed to the pressure of steam; these wings or leaves being made to work through slits or openings of a cir-

cular plane, which revolves obliquely to, and is thereby kept in contact with the side of the cone." But when the reader has read this description of the engine, we are afraid he will not be much the wiser for it; indeed, we never before met with an engine of which it was so difficult to convey, in words, a clear and distinct notion, and which was at the same time so little complex in its construction. We shall, therefore, be obliged to depend more than usual on the assistance of our engraver, to make the following description plain to our readers.

Fig. 1, Pl. XVIII. represents a longitudinal section of the engine, the circular chamber being supposed to be cut through the centre line. A A is a circular chamber made in two parts, joined at *a a*, and fixed to a frame B B; this frame also supports the axis or main shaft C, to which is fixed the cone D. E E are two wings or leaves fixed to the cone; and *e* is a metallic segment, fitted into a groove made in the curved edge of the leaf, and pressed towards the chamber by springs in order to prevent the escape of steam. F is a circular plane, revolving on a shaft or pivot G, and supported by the main shaft (as shown in fig. 4). The oblique position of this circular plane, it will be seen, is so adjusted that its surface shall be parallel to, and in contact with, the side of the cone. H is a metallic ring fitted into a groove round the cone, and divided into segments, which are pressed towards the chamber by springs, to answer the purpose of packing. I is a metallic ring for the same purpose, fitted round the circular plane. K is a cylindrial brass for the pivot G to work against *e*, regulated by a key *k*. L is a conical brass guide, kept in its place by a set-screw *l*. M is a screw-pin for giving oil to the pivot. N N are conical brasses for the main shaft to work in, and kept in their places by set-screws *n n*. *o o* are screw-bolts for securing the engine frame. P is a pinion or small wheel, for the purpose of communicating the power of the engine to machinery which may require a different speed. V is one of the slits or openings in the obliquely revolving circular plane, through which the leaves work; this slit is of equal length with the leaf, and widening outwards from the surface of the plane to accommodate the change of the angular position of the leaf, which takes place during each revolution. *v v* are metallic rods, kept tight against the leaf by springs, to prevent the escape of steam. W W W are thin flat arms for supporting the circular plane.

Fig. 2 represents the plan or top-view of the engine, showing the exterior of the circular chamber, the frame-work, main-shaft,

pinion, &c. (It may be as well here to state, that similar letters are used to denote similar parts in all the figures). Q is the pipe through which the steam enters the engine, and R the pipe through which it escapes.

Fig. 3 is an end-view or cross-section of the engine, taken through the dotted line marked in fig. 2. The steam passes from the pipe Q into the circular chamber through an opening S cut through its side; this opening is of a triangular shape, and made as wide at the top as the circular plane is there distant from the base of the cone, and gradually tapering off downwards. T is the opening through which the steam escapes, and in every respect similar in construction. The dotted line U shows where the cone and the circular plane come in contact. *e e* are the metallic segments already described.

Fig. 4 is a detached view of the cone in the circular plane, representing a section through their centres. It will only be necessary to observe, that *d* is a collar on the main-shaft, by which the cone is fixed thereto; that *c* is a socket-ball working in the socket *f* of the circular plane; and that the dotted lines E E show the precise shape of the leaves or wings fixed to the cone.

Having thus described the nature and construction of Mr. Ericsson's engine, we shall now proceed to explain the manner in which it is set to work. Steam being admitted into the pipe Q (see fig. 3), it passes through the opening S into the circular chamber, and being there prevented from passing the line U, where the cone and plate come in contact, it presses against the upper leaf, which, together with the cone, then revolves in the direction of the dotted arrow. Now, as soon as the said leaf gets below the top of the opening T, the steam that has been acting escapes through that opening into the pipe R, and thence into the atmosphere or into a condenser. The opposite leaf then operates in a similar manner, and so on as long as steam is admitted.

Many as have been the engines contrived for the production of rotary motion, we recollect none in which that result has been obtained by such a perfect harmony of operation among the different parts. Not only the general action of this engine, but the action of *every part* of it is rotary.* The consequence is, that it is wholly free from those serious drawbacks which make the

* Will the Editor of the M. M. favour us and his other readers with an explanation of the *rotary action* of the wings or leaves E through the slits V, in the oblique plane F? for we confess we have never seen any thing *look* more like a reciprocating or vibrating action.

attainment of a very quick motion, by means of a reciprocating engine, a matter of so much practical difficulty. A vast increase of power is obtained, while the bulk and weight of the materials employed for the purpose are reduced beyond all former example. We shall endeavour to make this clearer by a few calculations.

The engine represented by the drawings (made to 2¼ inch scale) presents to the action of the steam 12 square inches within the leaf, and is in a vertical position; but that being the maximum of surface exposed, a mean must be taken, which, by the assistance of fluxions, will be found to be 10 square inches within a fraction.

By referring to the scale it will be seen that the globular chamber of this engine is 13 inches diameter. An engine of three times the size, that is, with a chamber of 39 inches in diameter, would, sherefore, expose 90 square inches in the action of the steam; and the average distance performed by the leaf would be 7,35 feet for each revolution, and if the engine made 180 revolutions in the minute, 1,323 feet would be the distance passed in that time. If, now, steam of 45lb. pressure to the square inch were used, 4,050lbs. would be the constant force in operation, which, multiplied by 1,323, shows that 5,358,150lbs. would be raised one foot high per minute; and this sum divided by the established number 33,000, gives for the general result 162 horses' power. Now, if we deduct one quarter for friction, &c., which considering the harmonious actions of the engine, is amply sufficient, the available power will be 120 horses!*

That so great a power should be produced by a globular vessel of only three feet three inches diameter, is a result so extraordinary, that the attention is naturally and anxiously drawn towards any probabilities by which it may be defeated. The probability of the action becoming affected by leakages first presses itself on our consideration. On this head it may suffice to observe, that as none of the packings require any other play than to be moved gradually against their respective surfaces as they wear away, all that is required to ensure tightness will be good workmanship. The next contingency which suggests itself is the ordinary one, of liability to derangement. On this score, however, there is but little to be feared, for the engine is of so few parts, and the mutual action and re-action of these parts is so simple

* If we recollect rightly, the Editor of the M. M. considered the chief *defect* of Mr. Ericsson's former engine of (nominally) 50 horses to be, its having too much power; how, therefore, would he have us regard this engine which has *double* the power in the same space?

and natural, that unless wantonly injured or obstructed, it can scarcely go wrong. We apprehend that the only real danger to be guarded against is the heat, which may be generated by the rubbing parts when the engine is put to its speed; between the bearings and gudgeons in particular, as they will have to withstand a great force. Experience can on this point be the only guide to a correct conclusion; but we incline to think, that as no inconvenience is found in cotton mills by giving shafts of a large size, and communicating great power, a velocity of 180 revolutions per minute, any deduction to be made on this account from the utility of the engine will be but trifling. As to the packing-rings, the pressure on them will be slight; indeed, their centrifugal force will be nearly sufficient to give them always an outward bias; the danger of their heating must therefore be extremely small.

It may not be amiss to observe, that the principle of the engine is such, that the steam may be admitted from either side with equal effect. The motion can therefore be reversed, by merely reversing the inlets and outlets of the steam by means of a common slide-valve or four-way cock—a feature of this engine, which, to say nothing of its speed, must render it particularly applicable to all locomotive purposes.

The branch of steam service, however, in which this engine is likely to be adopted with the greatest benefit is the marine. In steam vessels, lightness, compactness, simplicity, are all properties of the utmost importance; and doubly so, when they can be obtained, as in this instance, without any sacrifice whatever of power.

When water is employed to work this engine, the operation will be precisely the same as in the case of steam, with this exception, that the packing rings may be dispensed with. The exception, however, is of a nature which shows that as a hydraulic engine it will work even better than as a steam engine; of this, however, more hereafter. At present, we trust we have said enough to satisfy our readers that the great space we have devoted to this *latest wonder* of the mechanical world has been not unworthily occupied.

SPINNING.—To Henry Gore, of Manchester, Machine Maker, a patent for "improvement in the machines commonly called by spinners *throstle machines* and spinning frames, which machines operate by spindles and flyers, for spinning or twisting yarn or

threads," was granted on the 22nd of December, 1831, and the specification was deposited in the Enrolment Office, on the 22nd of June, 1832.

The improvement contemplated by Mr. Gore will be readily understood by reference to fig. 3, Pl. XVII., where *a a* represent a bobbin on which the yarn or threads are to be taken up as they are spun or twisted; *b b* shew the spindle which gives motion to the flyer *c c* and bobbin, by means of the pulley *d*: *e e* shew a tube fixed by the flanch *k k*, and the screwed nut *l*, to the spindle frame. This tube, which extends to *h h* near the top of the bobbin, allows the spindle to turn within it and the bobbin to turn without it. The spindle is steadied at the top by the bush *g g*, and the bobbin is steadied at the top by a bush of the usual construction at its upper end. The bobbin is steadied at its lower end by the brass bush *i i*, and it rests upon the washer *f f*, supported by the flanch *m m*. The bearing piece *k k* is hollowed out in the form of a cup, for the purpose of containing a supply of oil for the lubrication of the tapering end of the piece *m m*. The other parts of the throstle machine do not vary from those in common use, and therefore are not described in the specification. The advantages proposed to be obtained are greater steadiness in the action of the moving parts, an object of very considerable importance in machinery moving at great velocities. It is also stated that there are facilities for adjusting the friction necessary to regulate the taking up motion of the bobbins.

STEAM ENGINE.—To Samuel Hall, of Basford, in the county of Nottingham, Cotton Manufacturer, a patent, "for an improved piston and valve for steam gas and other engines; also an improved method for lubricating the pistons, piston rods, and valves or cocks of such engines, and of condensing the steam, and supplying water to the boilers of such engines as are wrought by a vacuum produced by condensation," was granted on the 22d of December, 1831, and the specification was deposited in the Enrolment Office on the 22d of June, 1832.

The improved piston proposed by this patentee has for its object the adjustment of the pressure of the packing of the piston against the interior of the cylinder to the pressure of the steam, or other actuating force against the top or bottom of the piston. This is effected by making the top and bottom plates of the piston to approach each other, from the application of a pressure on either, both plates being made conical and placed with their

narrowest ends towards each other, leaving between them a space for the packing, which space being diminished by the approach of the plates causes the packing to press forcibly against the cylinder. The rod is furnished with stops to prevent the upper plate from moviug up the rod, or the lower plate from down it beyond the same, while they are fitted on so that the upper one may move down and the lower one move up by the application of pressure on either.

To obviate the irregularities and openings caused by the unequal expansion of the different of the sliding valves of a steam engine, is the object contemplated in the second part of this invention. To effect this object it is proposed to divide the upper or sliding plate into several portions, each large enough to cover the rectangular steam openings in the lower plate. The plates are made hollow, with passages for steam, that the heat, and consequently the expansion, may equally pervade all the parts of the valves.

A method of lubricating the different parts of a steam engine is next described to consist of, first, a communication from an oil pump to the steam supply pipe, near the throlle valve, by which meansthe oil will be supplied to the cylinder, both above and below the piston, with the steam. The oil, in the next place, is, after being used, transmitted through a series of long vessels, placed vertically, by which the oil is seperated from its impurities by the the application of heat and water from the condensed steam, and on the surface of the water in these separating vessels, the purified oil floats, and is drawn off through a pipe, and returned to the cylinder by means of the forcing pump before noticed.

The manner in which the condensation is proposed to be effected in such engines as work by vacuum (produced by the condensation of the steam), will be best explained with reference to fig. 5, Pl. XVIII., where *a* represents the opening into the condenser *b*, which is a rectangular vessel of the breadth of the the whole apparatus, and has a vertical partition *c*, perforated with numerous small holes for the passage of the steam to the opposite side of the partition; at *d d* the vapour enters one of the ends of an extensive system of small tubes, surrounded by cold water contained in the cistern *f f*, the resulting condensed water in the tubes flowing out at the ends *g g* into a water-tight receptacle, whence it is conducted off by a tube at *h*, into the separating vessels before described for recovering the oleaginous lubricating matter that may be mixed with it.

The cold water is brought on by the pipe *i*, and falls first upon a metallic cover to the cistern pierced with numerous holes, which distributes it uniformly over the whole system of tubes, and finally runs off at bottom by the pipe *k k* at an increased temperature.

The aggregate dimensions of the perforations in the partition *c*, should correspond with the area of the tube which conducts the steam from the engine; and the entrance orifices to the tubes should be similarly proportioned, but the exit orifices at the opposite ends need be only one tenth the area of the others. The openings are file-cut slits made in the upper part of the end caps. The tubes are secured by screws, nuts, washers, and packing to their end plates in the manner usually practised by workmen; but our drawing is on too minute a scale to exhibit it.

ON THE APPLICATION OF PYROLIGNEOUS ACID TO THE PRESERVATION OF SHIP TIMBER, &c.

A GENTLEMAN of New York, who has been engaged for several years past in conducting a series of experiments for the preservation of ship timber, has discovered and demonstrated, that the pyroligneous acid is one of the best agents to preserve wood from decomposition by the dry rot and the worm. For this purpose, he took small pieces of different kinds of wood, green as well as seasoned, and exposed them, in a damp place, to the action of warmth and moisture. Those pieces which had been previously saturated with the pyroligneous acid, remained indestructible, while those of the same kind of wood which had not imbibed the acid, went soon to decay by the mould and the dry rot. It has been long known that this acid will preserve animal substances from decomposition; but, that it will preserve vegetable substances, as timber and planks, has not been so well known, or so fully and generally admitted; though many facts might be stated to prove its efficacy when it has been casually or accidentally applied.

The ease and simplicity of the process recommend it to the notice of shipbuilders, who, it is hoped, will generally adopt it. When seasoned timber or plank are hewn into the intended shape, put them under cover for a week or ten days, to protect them from the rain. During this time, let the acid be applied to the surface daily, by a brush. It will penetrate an inch or more into the substance of the wood, and will be found an effectual preservative. The central part of the wood, or the heart of oak, being less liable to decomposition, will require less of the acid. The frame of the ship or boat may be then put together, when all the external parts of the timber are completely saturated, but not before.

The pyroligneous acid may be applied in a still easier way. Build a house of brick or boards, in or near the ship-yard; let it be of proper dimensions, according to the size of the ship intended to be built. Make it tight, or nearly so. Into this house let the timber and planks, after they are hewn to the requisite size and shape, and properly prepared, be stowed, with suitable dunnage placed between the different sticks. Take any common stove, place it outside the building, and let the pipe enter the side of the building, about a foot and a half from the ground. A fire being made in the stove, of small pieces of oak wood, the smoke will enter the house; the room will soon be filled with it, and the timber will readily imbibe the acid. Keep it exposed constantly to the action of smoke for a week; in this time the external part of the wood will be found saturated with the acid; it will be glazed or coated over with a gummy, resinous substance: the wood will shrink or become consolidated, and will be ready to be framed. By this process, green timber may be pretty well seasoned in a week. The smoke house should be detached from other buildings, and carefully watched, to prevent accidents by fire.

A ship, after she is launched, may be fumigated to advantage, by making a fire of oak chips in a stove in the lower hold, and closing the hatches; but this is an imperfect method of using the acid, because it cannot be applied to all the parts of the plank and timber, by reason of their contact and adherence. The smoke, however, if continued a week, will be extensively applied to the materials which compose the inner surface of the ship, and will contribute much to their duration. The fire must of course be carefully watched by lifting the hatches occasionally.

Green timber cut in the thick forests of the interior, which is naturally porous and spongy, after being saturated with this acid, will be nearly as good for ships, steam, and canal boats, as the teak wood of the East Indies, or the live oak of our sea coasts.

This process of fumigation is easily applied to water casks, destined for the reception of water during a long voyage. When the staves are trimmed to a proper shape, let them be exposed to the action of smoke for a few days; and then let the hogshead be put together. Hoops made of green wood are particularly subject to dry rot, if the cask is placed in a damp situation. If saturated with the acid, this will be prevented.

Sailcloth exposed to the action of smoke for a short time, will be rendered less liable to mildew, The pyroligneous acid may be applied advantageously to the wooden materials which compose the roofs of houses; which, being exposed to the alterations of humidity and desiccation, go soon to decay; also to the wooden materials which are used in cellars.

Gun carriages, previously to being painted, should be saturated with the acid, which will enable them to endure the weather, without decomposition. The same may be said of carriage wheels to be used on land; and of the wheel-work for mills. In short, the pyroligneous acid may be advantageously applied to many sorts of wood-work,

which it is needless here to particularize; it being one of the most powerful agents to resist decomposition.

Posts which are intended to be set in the ground, instead of being charred, may be saturated with this acid, which will render them indestructible. This hint will be useful to farmers. The acid may also be applied to the roots of peach and other fruit trees, as it prevents the worm from attacking them.

If woollen cloths be saturated with this acid, the moths will not consume them, but the colour will be injured. So if paper, previously to being printed, be saturated with this acid, the moths will shun it; the whiteness of the paper will, however, be injured.

Rich and valuable furs are apt to be injured by insects. By being first immersed in the acid, or fumigated sufficiently, the insects will avoid it. The acid is applicable also to raw hides; previously to being put on board ships, they should be well fumigated, to prevent the injury they are apt to receive from insects.

We may congratulate the mercantile and seafaring part of the community, on this valuable discovery, which, if generally adopted, will be the means of saving life and property, by increasing the strength and durability of ships. It will also tend to diminish the expense of ship-building, and to lessen the rate of insurance.—*New York Daily Advertiser.*

EXTRAORDINARY AMERICAN COCOONS.

[From the Journal of the Franklin Institute.]

Letter from PETER S. DUPONCEAU, ESQ., *accompanying some cocoons produced on the estate of the* HON. HENRY BRY, *of Monroe, district of Ouachita, Lousiana, and which were deposited at the exhibition of the Franklin Institute, in October last.*

I HAVE the pleasure of sending you a parcel of cocoons, weighing something less than two pounds, for which I beg you will obtain a place at the exhibition of the Franklin Institute. These cocoons are all that remain of a large quantity sent to me as a present by the Hon. Henry Bry, of Monroe, in the district of Ouachita, in Louisiana, and are the production of his estate. Although not remarkable for their size, they contain more silk than any I have ever seen, or, indeed, that I have ever heard of in any part of the world. Fourteen pounds and six ounces of them have produced, on reeling, three pounds eleven ounces of fine raw silk; which is about three pounds and three-quarters of cocoons to one pound of silk; which is truly astonishing, when it is considered that in Europe twelve pounds of cocoons are required to produce one pound of silk. I am speaking, it is true, of cocoons containing the live chrysalis; but allowing 25 per cent. which is a large allowance, for the loss of weight by baking, and the diminution during the voyage from the interior of Louisiana to this city, it would still have required on the European calculation, nine pounds of cocoons to produce one pound of silk, whereas

that quantity was produced from less than four. I have witnessed this fact, and can attest it of my own knowledge. You will observe that the cocoons are hard and compact; they reeled off quite to the chrysalis, which fell of itself into the basin, without a single particle of silk. I have thought this explanation necessary in order that the extraordinary excellence of these American cocoons may be fully understood.

The next best cocoons I have received this year, were sent me, also a present, by the lady of Thomas Sumter, Jun. Esq., the son of the venerable General Sumter. They were raised on the family plantation at Statesburg, in Sumter district, South Carolina. Five pounds of these produced one pound of raw silk, and no doubt would have produced more, if that excellent lady had not been confined to her bed by sickness, and could have attended herself to the rearing of her silk worms, as I had some before of her raising which did not yield to those of Louisiana. I have kept none of these cocoons, having converted them all into silk. They were of the large kind and very beautiful.

I have seen cocoons as fine in their appearance as those I have mentioned, but none that produced so much silk; from whence I infer that our southern districts are admirably calculated for this production.

I have not attempted this year to manufacture any silk, as that is not my immediate object. What Mr. D'Homergue did last year, was only to shew what could be done, even without the necessary machinery. Since that time a throwsting mill has been erected at Manayunk, at which I have had some silk thrown, reeled by our women in the second year of their instruction, which has turned out very well, one parcel having given only six per cent. waste, and the other seven, though the cocoons were of an inferior kind. I have given the thrown silk to a manufacturer, to be converted into stuff for silk hats. I mean to make similar experiments with the remainder, availing myself as much as possible of our various manufacturers. I find, however, that their looms, and their carding and other apparatus, are not exactly suited to the silk manufactures, nor is there yet any complete apparatus for the making of sewing silk. But we are proceeding so fast, that next year, or perhaps before, these inconveniences will have vanished.

I have, therefore, nothing to exhibit this year except these cocoons. I might send skeins of raw silk, as I did last year, but they must either be placed beyond the reach of hands, and then they cannot be well judged of, or they must be suffered to be handled, which soon renders them unfit for use. Besides, the proper test of the value of raw silk is by submitting it to the process of throwing. Silk may appear outwardly very fine, which, in that process, will run to waste.

I am, with great regard and esteem,
Dear Sir,
Your most obedient humble servant,

Philadelphia, October 3, 1831. PETER S. DUPONCEAU.

P. S. I expect every day, from England, samples of stuffs manufactured from our American raw silk, but it is not probable that they will come in time for this exhibition, which I greatly regret.

Letter from P. S DUPONCEAU, ESQ. *to the Editor of the Journal of the Franklin Institute, on* GENSOUL'S STEAM APPARATUS FOR SILK FILATURES.

Philadelphia, 22nd September, 1831.

DEAR SIR,—In a French work on the subject of the silk trade,* which I lately received, I found a description, accompanied with a plate, of M. Gensoul's celebrated apparatus for conveying, by means of steam, an equal degree of heat to the water contained in any number of basins, employed in a filature of raw silk. Thinking that the publication of this description in the Journal of the Franklin Institute may be of use to our fellow citizens, at a moment when the public mind is actively employed on the subject of the culture and manufacture of silk, I have extracted it from the original work, and have the pleasure to send you a copy of it, and also of the drawing, of which you will make what use you shall think proper.

I am, very respectfully,
Your friend and humble servant,
PETER S. DUPONCEAU.

Report on M. GENSOUL'S *steam apparatus for silk filatures, made to the Agricultural Society of the department of the Rhone, in France. By* DR. TERME.—*With a Plate.*

GENTLEMEN,—Although you are all well acquainted with Mr. Gensoul's admirable apparatus, still we think it adviseable to lay before you a hasty and general description which will suffice to convince you of its great usefulness. M. Gensoul's objects, and the results which he has obtained, are the diffusion of a sufficient degree of heat from a single furnace to any number of basins—the systematizing of the work of the women employed in spinning—the raising gradually, but with rapidity, the water in the basins to any required temperature, preserving it at the same time perfectly pure—lastly, the increasing the amount of the products of spinning.

The apparatus consists of a boiler provided with a steam gauge and a safety valve; the boiler is placed in a furnace heated by means of bituminous coal.† The steam thereby generated passes into a main pipe which extends horizontally through the whole apartment at an elevation of about ten feet from the floor. From this main pipe, descending pipes branch out laterally; each of these is bifurcated, and supplies two basins with steam. These pipes are terminated by a

* Du Commerce des Soies et Soieries en France, par M. Leon de Teste, Avignon, 1830.

† Anthracite may, we think, be used with equal advantage.—PUB. COM.

are firmly fixed in the centres of cog wheels. These wheels are of such diameter, that when the boxes are in their places, the peripheries of the wheels will approach each other within the distance necessary to allow of an endless screw to pass between them. The cogs of the wheels are cut, or made beveling, so as to adapt them to the threads of such a screw.

The platten or follower, is placed below the two cog wheels, so as to raise and lower with them. The lower ends of the boxes, or nuts, are attached to the upper side of the followers, and are to swivel in or on it. Upon the upper side of the platten, an endless screw turns in collars, its threads taking into those of the cog wheels. At the outer end of its shank there is a crank, or handle, for the purpose of turning it.

The screws which occupy the places of cheeks in the ordinary press must have their threads cut in a direction contrary to each other; that is, one of them must be a right, and the other a left-handed screw; as the endless screw will turn the cog wheels in opposite directions.

A press, operating in a way somewhat similar may be made with the side screws both right or left handed, but in this case two endless screws must be cut on the same spindle, and so placed that one of the screws may act upon the periphery of one wheel, and the other on the periphery of the opposite wheel. This spindle must extend along the front or back of the press.

What I claim as my invention, and for which I ask a patent, is the application of screws instead of cheeks to the sides of the standing press, so connected that the raising or lowering of the platten or follower must be effected by means of cog wheels, and an endless screw or screws, operating upon the principles herein described.

Charles Evans.

Specification of a patent for an improvement upon, or addition to, a combination of liquids to be used as a substitute for oil in the production of light; for which a patent was granted on the 16*th day of October*, 1831. Isaiah Jennings, *city of New York, June* 13, 1831.

I take the spirit or essential oil, distilled from tar, or any of the vegetable essential oils, or the spirit of coal tar, which is a species of naphtha, or that obtained from the Seneca oil, or other bitumens, by distillation, and combine them with alcohol, or spirits of wine, as I have heretofore combined the essential oil, or spirits of turpentine, therewith. This I do in such proportions as may be found expedient, according to the nature and purity of the articles employed. When the alcohol is highly rectified, it will combine with a larger portion of the other ingredients, than that which is of lower proof. The general rule is to add to the alcohol as much of the other ingredient as can be taken into combination with it, which may vary from one-fourth to one-eighth part, the quantity of alcohol always greatly predominating.

The combination of liquids thus produced, I use as a substitute for oil, to burn in lamps of any description in which oil may be burnt.

What I claim as my invention, or improvement, is the combining of the articles above specified, with alcohol, in the manner, and upon the principles hereinbefore set forth, for the purpose of burning the same as a substitute for oil in lamps.

ISAIAH JENNINGS.

Specification of a patent for a mode of preparing Alcohol, or Ardent Spirit, from Grain, or other vegetable substances capable of undergoing the vinous fermentation, and of employing the residuum more advantageously than has been hitherto done. Granted to ISAIAH JENNINGS, *city of New York, June* 13, 1831.

I TAKE the grain, meal, flour, or other vegetable matter to be fermented, and I add to it a quantity of water sufficient to give it a consistence about equal to that of homminy, or paste, and in this state I add to it yest, or other ferment, and allow the vinous fermentation to take place; as soon as this is completed, and before acidity commences, I place the material so fermented in proper distilling vessels, and submit it to the proper degree of heat, by means of steam, heated air, or any other agent the temperature of which can be governed so as to prevent all danger of burning, and I then draw off all the spirit from it. After this has been effected, I continue the heating process until I render the vegetable substance as completely dry as though it had been kiln dried. This substance is then fit to be stored away, or ground into meal, and bolted, so as to be employed as food for man, or other animals. Wheat, or other grain, which has been submitted to this process will make perfectly sweet bread, and will rise without requiring yest, or other ferment.

What I claim as new in the above process, is the fermenting of the vegetable materials with no more water than is necessary to give them the consistence designated, and afterwards employing the dried residuum for the purposes hereinbefore set forth.

ISAIAH JENNINGS.

Specification of a patent for a new method of washing Rags in the manufacturing of Paper. Granted to DAVID AMES, *Jr. and* JOHN AMES, *Springfield, Hampden county, Massachusetts. Assignees of Samuel Eckstein, Philadelphia, June* 13, 1831.

INSTEAD of the washer, or screw, now in use, I employ a circular disk or plate, which is covered with wove wire, and is made to revolve within the cistern, or vat, of the paper engine, against the side opposite to that on which the cylinder, or roll, is placed. The revolution of the circular disk is effected by means of a pinion upon the shaft of the engine, which pinion mashes into a cog wheel placed

upon the same shaft upon which the disk, or plate, is fixed, and with which it revolves.

A brass ring, which may be one foot in diameter, and one inch in thickness, is fastened by bolts, or screwed, on the inside of the cistern, concentric with the shaft upon which the disk or plate revolves. This shaft carries, upon its inner end, a brass wheel, which may be twenty-two inches in diameter, more or less. The face of this wheel, towards the inside of the engine, receives the covering of wove wire. It has on the back of it a secondary or smaller rim, of such a size as to fit against the fixed ring, first mentioned, and forming a joint with it. A rim of wood is screwed on to the face of the larger brass wheel, to which to attach the facing of wove wire through which the water is to run from the vat. Below the fixed ring, a space six inches wide, and an inch deep, is cut out of the side of the engine, and through to the bottom; this space, when covered with a sheet of copper, forms a vent for the water which passes from the engine through the wove wire into the space formed by the projection of the fixed ring. Through this wire disk and these openings, the water finds a free exit, without obstructing the motion of, or wasting, the pulp. A larger quantity of water, therefore, may be admitted into the vat than is ordinarily done; and the washing is more rapidly, effectually, and economically performed, than by any other means now in use.

What I claim as my invention, is the revolving disk or plate, covered with wove wire, and so placed within the vat of a paper engine as to allow the water to pass freely through it, upon the principle, and for the purposes herein described.

Samuel Eckstein.

It will be seen that the effect produced by the invention of Mr. Eckstein is similar to that of Mr. Ames, the specification of which was inserted some time since. To prevent all interference the Messrs. Ames became the purchasers of the improvement above described.

THE INFLUENCE OF LITERATURE AND ART IN INDIA.

The ancient Egyptians wrote a language of signs and symbols, which Europeans have not yet mastered; the early Christian Missionaries taught savage nations the mysteries of the atonement by the same means; and something like this primitive mode of instruction still prevails in the Indian Peninsula, and in the tributary isles. There the native tribes, by means of painting and sculpture, and dramatic representations, not only maintain a correspondence between cities and nations, but keep up an uniformity of character, and preserve an air of politeness in their intercourse, which their knowledge of these arts inspire. They

are, in truth, an indolent people, and are content to go the shortest way to acquire the little learning they desire. They would dislike to study painting and sculpture in academies, but they would lie and gaze by the hour on a noble statue or an historic painting, and imbibe a far loftier notion of the power of the people who produced them, than they could do any other way: they would smile were they desired to puzzle out the meaning of Shakspeare through the medium of their broken English, but they would go in crowds to see Macbeth represented. They dislike all mental labour, and much of the bodily too, and as art springs from nature, and speaks all languages with the same clearness and fluency, they are content to take her for their schoolmistress.

We have been led into these remarks. by reading the evidence lately given by Sir Alexander Johnston, before a Committee of the House of Commons, for inquiring into the affairs of the India Company, and the condition of the people of the East. Sir Alexander has considered the subject ripely! to his own observations he has added the testimony of many intelligent officers, who have served or are serving in that country; and we look upon his remarks as of great importance to those who desire to extend in India, European knowledge and taste, and maintain among the numerous nations an idea of our mental as well as bodily superiority. Nor will it be useful to the East alone; it will confer a benefit upon art in this land, and show our Academy that the East opens her gates to receive their works, though the country is reluctant to purchase them at home. To all those who join in these sentiments, and they are founded on knowledge, the more complete introduction of painting and sculpture, and the drama, into the East, appears a matter of vast importance—they are looked upon as ready instruments for improving the understanding, raising the moral character, and securing to Britain the admiration and attachment of the natives of India.

With this in his mind, it is proposed by Sir Alexander, that our Indian Government be empowered to lay out a certain sum annually, to encourage historical painters, sculptors, and dramatic writers, in the production of such works as may suit the character and feelings of the people of the East, and at the same time place before them distinct and attractive images of our power, our prowess, of our sciences, our commerce, and our freedom. The subjects on which artists and authors would employ their talents, might be chosen for them by persons conversant with the character and condition of the people, and an annual report made by our Indian authorities, upon the moral or political effects which such works produce on the natives. Such is, in brief, the proposal of Sir Alexander: it is, in truth, but an extension of the principle upon which he has himself privately acted; he has sent out sculpture and dramatic poetry—written on purpose by Joanna Baillie; and as the results have been favourable, he feels that the nation might with propriety do something in the same way for the benefit of both countries.—*Athenæum.*

AMERICAN ANTIQUITIES.

While our antiquarians have been turning up every barrow and molehill in search of novel facts (and what could England be expected to yield, whose history can be traced in a continued stream from Julius Cæsar to the present time?), similar excavations have been carried on in North America, that cannot fail to be interesting from the lights they are likely to throw on subjects of considerable obscurity. In the barrows there opened have been found, together with human skeletons, earthen vessels, and utensils composed of alloyed metals, indicating the past existence of an art at present unknown to the nations of that continent. This fact, connected with others produced by Robertson, and confirmed by Bullock in his 'Museum of Mexican antiquities,' is sufficient to prove that America, though called the New World, is quite as old as our portion of it; nor is it at all improbable that we are the youngsters of the race of Adam; for, with the exception of the Pyramids of Egypt, and the Vases lately discovered in Italy twenty feet below the present surface of the soil, we have nothing in Europe to show, as proofs of antiquity, equal to the fact recorded by Mr. Ferrall;* who states, that at the Bull Shoals, east branch of White River, in Missouri, several feet below the surface of the river, reliquiæ were found, which indicated that the spot had formerly been the seat of metallurgical operations, where the alloy appeared to be lead united with silver; arrow heads also cut out of flint, and fragments of earthenware that had undergone the operation of fire were found there; and though we have no data to tell us at what time these operations were carried on, the period must have been very remote, as the present banks have been since entirely formed by alluvial deposits.

A still more curious circumstance, mentioned by Mr. Ferrall also, is, that a few years since a number of pigmy graves were discovered near Merrimac River, in St. Louis County. The coffins were of stone, and the length of the bodies could not have exceeded three feet and a half to four feet; and, as the graves were many, and the skeletons in some nearly entire, it was easy to perceive they could not have been those of children.

Of this discovery notice has been taken by Mr. Flint, who observes, "that the more the subject of the past races of men and animals in America is investigated, the more perplexed the inquiry becomes. The huge bones of the animals indicate them to have been vastly larger than any now existing, while all that I have seen and heard of the men seems to show, that they were smaller than the men of our times."

It is not, however, so much by the size of men, as by their proficiency in the arts, that we can form the best idea of the antiquity of any given race. Now, as we partly prove the antiquity

* See 'Rambles through the United States of America,' Athenæum, No. 250.

of Egypt by the different facts connected with the mummies, so is it fair to infer, that where mummies are found in America, there we have convincing proofs of the existence of a race long since extinct; and when once the mind is thus thrown back on the past, there is no limit to the view it either sees, or fancies it sees.

But it will be said, that if the world be so very old, how can we account for the daily discovery of new people in different portions of it? The fact is, the people so met with may have existed time out of mind; as in the case of Clapperton's recent discovery of a numerous nation in the very heart of Africa, who must have existed there for many hundred years: and even the discovery of the New World only proves, that though the means of getting to America had existed for many years, yet the motive for making the voyage never existed; or if it existed in single individuals, still they might want the means of putting their wishes into execution.

True it is, that there is less chance now than ever there was, of people and places, once well known, being completely forgotten in consequence of the invention of printing; yet even a language that has been committed to print may be lost, as in the case of the Polish language, which, in all likelihood, will now be swallowed up in the Russian, and in after times be studied only as the hieroglyphics of Egypt, or the less intelligible arrow-headed letters on the bricks of Babylon; nay, even Greek itself—the noblest medium ever invented by man to convey his thoughts,—stands every chance of being, ere long, really a dead language, when we find so little attention paid to it in a country that, in other respects, is boasting of its high state of civilization.

It requires then no spirit of prophecy to predict, that almost the whole of Italy will become as little known to the inhabitants of Australia, as New Holland now is to the people of Italy; for unless the Australians be led to the Mediterranean for the purposes of commerce, what earthly motive will there be to induce them to pass the straits of Gibraltar?—nay, more, what motive will ever lead them to England, when the only native produce that this country can yield (its tin), will be either exhausted, or the market be better supplied by some the islands in the Indian Archipelago?—and when that time shall arrive, thousands of years may pass before England, once lost, shall ever be recovered.

To return, however, to the more interesting subject of the American Mummies, we will extract the description given by Mr. Flint, from which it will appear, that though the American embalmers were not equal to the Egyptians in all the accessories of the art, still they knew enough of it to enable them to preserve the bodies of the dead to a time when every other trace of the existence of the embalmers was lost:—

"The two bodies that were found in the vast limestone cavern in Tennessee, one of which I saw at Lexington, were neither of them more than four feet in height. It seems to me that this

must have been nearly the height of the living person. The teeth and nails did not seem to indicate the shrinking of the flesh from them in the desiccating process by which they were preserved. The teeth were separated by considerable intervals; and were small, long, white, and sharp, reviving the horrible images of ogres' teeth. The hair seemed to have been sandy, or inclining to yellow. It is well known that nothing is so uniform in the present Indian as his lank black hair. From the pains taken to preserve the bodies, and the great labour of making the funeral robes in which they were folded, they must have been of the 'blood-royal,' or personages of great consideration in their day. The person that I saw, had evidently died by a blow on the skull. The blood had coagulated there into a mass, of a texture and colour sufficiently marked to show that it had been blood. The envelope of the body was double. Two splendid blankets, completely woven with the most beautiful feathers of the wild turkey, arranged in regular stripes and compartments, encircled it. The cloth on which these feathers were woven, was a kind of linen of neat texture, of the same kind with that which is now woven from the fibres of the nettle. The body was evidently that of a female of middle age, and I should suppose that her majesty weighed, when I saw her, six or eight pounds."

Many mummies have been found also in other part of America, especially in an extensive cavern, says Mr. Flint, near the Teeltenah, or *dripping-fork*, and not far from the point where the river empties itself into the La Plata.

In further proof of the great antiquity of the country as the abode of man, may be mentioned the loss of so many languages, all of which must have taken some time to establish, although their destruction might have been effected in comparatively few years.

Of the languages spoken by the aborigines of North America, three, it appears, are so distinct, as to have no perceivable affinity with each other, and still less, says Mons. Duponceau, with the European tongues, from which they differ in the marked peculiarity of dividing things into animate and inanimate, and not into genders, male and female; a distinction carried by all Europeans, except the English, to a most absurd length; although it must be confessed that, in the formation of the language, where genders are applied to inanimate objects, good reasons may have presented themselves to the inventors of the words, for such an apparently arbitrary difference—reasons, however, that it is difficult now to guess at, as we have lost the clue to lead us through the labyrinth.—*Athenæum.*

The List of New Patents will be given in our next Number.

PATENTS ENROLLED BETWEEN 10TH SEPTEMBER, AND 10TH OCTOBER, 1832.

Particularizing the Offices in which the Specification may be inspected, with the Dates of Enrolment.

SPINNING.—To R. Montgomery, of Johnstone, Renfrew, a patent for "construction of a machine for a new mode of spinning cotton, silk, flax, and other fibrous substances," was granted on the 26th of April, and the specification was deposited in the Enrolment Office on the 26th of June, 1832.

This invention consists in a certain addition to the flyers of spinning machinery, whereby such flyers always retain the same position, whilst the spindles round which the flyers revolve are caused to rise and fall, for the purpose of laying the spun fibre regularly on the bobbins, the spindles not being permitted to turn, but are fixed to the bottom or traverse rail, by which the flyers and spindles will be less liable to vibration than those constructed in the common manner. It is stated that the spindle on which the bobbin is built does not revolve as before described, it being made fast to the bottom or traverse rail *f*, and is moved up and down within the flyer, carrying the bobbin along with it, in order that the yarn or thread may be laid with regularity on the bobbin, the bobbin being loose, but resting on the ruff which is fixed on the spindle *i* and allowed to run on it, which it does by the friction or drag of the yarn or thread, as shown by fig. 1, Pl. XIX.

The rail into which the spindle is made fast, is constructed to travel up and down, or traverse exactly in the same manner as roving or throstle frames, and by a similar kind of apparatus, and which is well understood.

In spinning or roving soft twisted threads or yarns these may either be laid on a bobbin already described, or may be wound on a pirn of the usual construction, shown by fig. 2, and which, when full, will be in a proper state or shape, and ready to be placed in shuttle. Fig. 3 represents the yarn or thread laid on the bare spindle *i*, and in order that the friction should be as much relieved as possible, figs. 4 and 5, shewn in sections, are represented with the spindles *i*, inserted into the main spindle *k*, neatly fitted, whilst, at the same time, so easy, that these spindles *i* are capable of moving freely by the drag or friction of the yarn or thread in the act or progress of being laid on the pirn or bare spindle *i*, or otherwise on the common mule spindle, where it may be built without its being inserted in a socket, as shewn at *i*.

Fig. 4 is a cross section of fig. 2, and fig. 5 is a cross section of fig. 3.

It is to be understood that the spindles *h*, move or traverse up and down, through the flyers, which in every case remain stationary as to position, but are caused to turn, by means of bands from drums, cylinders, or any other mechanical power as is usually practised to obtain the proper or required speed, and in the way that throstles or roving machines are at present driven; *a a* the flyers, and also the wharves or pulleys to which they are affixed, for it will be seen the two ends of the flyers are affixed to the flange or rim A, which forms part of the wharves or pulleys, and this constitutes the main feature of the invention, from giving the power of performing the operations as now described, of building the cop upon the common mule spindle, equally with the inverted spindle, as shown in drawing *i*, as also the building of bobbin on the fixed spindle, shewn in fig. 1. *b b b* the stay rail, in which the upper part of the flyers turn, and are steadied; *c c* the guides for the fibre, there being four guides *c* on each flyer, only two of which however, are used, as shewn in the different figures: the top guides, which are made by a perforated hole through the tops of the flyers are in constant use as conductors to any two of the side guides on the legs or limbs of the flyers. *d d d d* mark the threads or yarns passing through those guides to the bobbins, pirns, or bare spindles, for the purpose of being wound thereon; *e e e e* the bobbins, pirns, or bare spindles, as are shown in all the figures.

In all these figures or sections, it will be understood that the flyer constantly remains in the same position as to height, and only revolves to the required speed, for laying on the yarn on the bobbins, pirns, or bare spindles, the upward or downward moving power being given and regulated by the copping rail *f*, with the spindle fixed on it, by a common traverse motion up and down within the legs or limbs of the flyers, so as to guide or lay the yarn or thread on the bobbins, pirns, or bare spindles, any of the copping or traverse motions will answer the above. The patentee has not deemed it necessary to shew or describe a complete spinning machine as the invention related only to the manner of constructing and using the flyers, and the various machines to which the invention may be applied being well understood. He claims the connecting the ends of the flyer to the driving wharve or pulley, and thus being enabled to keep the flyer in the same position, whilst the spindle rises and falls, and carries the bobbin (or other instrument

to receive the spun fibre) up and down with the flyer, for the purpose of laying the spun fibre regularly, in the manner above described.

SHIP'S COMPASS.—To T. Preston, Minories, London, Nautical Brazier, a patent for "an improvement in ship's compasses," was granted on the 26th of May, and the specification was enrolled in the Enrolment Office on the 26th of July, 1832.

This invention consists of improvements or additions to the common compass, to prevent the vibration to which the compass is now subject, and which at present tends to prevent the correct action of the needle. These improvements or additions consist of tubes or rings either attached to the ordinary cap which contains the agate, or the same may be attached to the card by means of arms. The pin on which the card is suspended, passes up through these tubes, and when the card has a tendency to vibrate, in consequence of any motion to the vessel, the lower end of the tube will come in contact with the pin, and stop such vibration, at the same time there will be sufficient play to ensure the action of the needle; and thus will compasses with these improvements applied be more correct in their action.

In the drawings annexed to the specification is represented a section of a common steering compass, having the improvements applied thereto; with the card, needle, agate, cap, and pin or point, on which the card is suspended in the usual manner, with a small tube attached to the cap descending down over the centre pin. It is connected to the card by means of screws or rivets passing through the arms; or in place of this short tube, a ring or perforated plate may be used, the object being evident, that of preventing the vibration of the card by the lower end of the tube or ring coming in contact with the suspending pin, and thus preventing further vibration than is necessary to insure free action to the needle; it is stated that very slight friction will be produced by the contact of the tube and supporting pin.

This improvement is also shown to be applicable to the description of compass wherein is used what is termed a dipping needle. The needle in this compass, in place of being affixed to the card, as is the case with the last described, is suspended on two axes, which are supported by the bearings which are affixed by screws to the card, and a circular plate is affixed to the cap to receive the other ends of the axes. Two upright pieces are affixed to the needle, and through these the axes pass, by which means the needle is permitted to swing up and down, as is usual

with this description of compass. The tube is similar to that described before, and has similar arms, with the usual supporting pin.

In using a compass, having this invention applied thereto, it will be evident that in case of any particular motion to the vessel, and which would cause vibration to the card of an ordinary compass, and would thus prevent the needle pointing correctly, such vibration would be immediately checked by the lower part of the tube coming in contact with the supporting pin, and enable the needle to be more correct in its pointing.

What the patentee claims as his invention is the application of the tube as described, whether the same be connected to the card by means of arms, or fastened directly to the cap with a view to prevent the vibration of the card and needle.

MINING.—To T. Petherick, of Penpellech, Tedwardreoth, Cornwall, Mining Agent, J. F. Kingston, of Ilsington, Devonshire, Gentleman, a patent for "improvements in machinery for separating copper, lead, and other ores from earthy and other substances with which they are or may be mixed; the said improvements are applicable to the machinery for which a patent was granted by his late Majesty to T. Petherick, dated April 28, 1830," was granted on the 8th of March, and the specification was enrolled in the Enrolment Office on the 8th of September, 1832.

In Mr. Petherick's former patent described in the 5th volume of the *Register of Arts*, p. 197, it is stated that instead of the usual process of jigging, he employs a large vat, tub, or vessel, with a fixed cover, in which cover are apertures and receptacles.

This invention consists in certain machinery thus composed; namely, a large vat, tub or vessel, with a fixed cover, in which cover are apertures and receptacles adapted to the form and size of a number of sieves, such as are or may be used for separating copper, lead, and other ores from earthy and other substances with which they may be mixed. The vat is filled with water; the sieves are to contain the copper, lead, or other ores, together with the earthy and other substances with which they are mixed, and from which they are required to be separated. The sieves are placed in their receptacles, and thus the contents of the sieves will be immersed in the water contained in the vat, the interior capacity of which must communicate with the interior of a hollow cylinder, into which a corresponding plunger, or piston, is fitted, to be moved alternately up and down in the cylinder, so

as alternately to displace water therefrom, and to force the same into the vat, and then withdraw the water from the vat into the cylinder, in order that the water in the receptacles wherein the sieves are partially and the minerals therein wholly immersed, may be alternately raised and lowered by a sudden flux and reflux, which is repeated and continued till the required degree of separation of the ores from the earthy and other substances with which they may be mixed is effected.

Now it is to this mode of separating ores which the improvements described in the specification of the present patent apply. They are divided into two parts: the first applying to the piston and cylinder of the apparatus as described in the specification of the former patent; and the second to the method of supplying water to the apparatus. The cylinder is to be provided with a bottom plate and foot valves, opening outwards, to allow the escape of the water into the vat, but not to permit its return; and the piston is furnished with valves opening downwards to allow the water to pass through it in that direction, so that the motion of the piston shall cause the water to pass through the cylinder the same as in a common lifting water pump. By this improvement the water instead of being made to pass up and down through the sieves containing the minerals, as formerly, it is forced right through the sieves by a series of impulses varying in extent and intensity with the proportion of the area of the piston to the areas of the sieves and the extent and rapidity of the motion communicated to the piston. The first mover may be either steam power, water power, horse power, or manual labour, as circumstances may require. It is proposed by the patentees as one modification to carry a shaft from a first mover over a series of separating vats placed in a row, and made to actuate each piston by means of a piston-rod and crank connected with the main shaft. In the second part of this invention it is proposed to admit the water from an elevated reservoir into the sieve vat instead of forcing it in by a pump as in the first part. If there be a sufficient supply of running water the elevated reservoir is to be kept constantly filled therefrom, and it is to be admitted into the vat and forced through the sieves by means of a stop-cock or valve in a series of impulses actuated by an hydraulic pressure proportionate to the altitude of the reservoir. Where there is not a running stream for the supply of the elevated reservoir, the water is to be pumped up again for that purpose, after it has passed through the sieves. The stop-cocks or valves for

the admission of the water from the reservoir to the vat, are to be opened and closed to produce the impulses either by a boy operating with a lever, or by being connected with one of the pumps or water wheels when such are used.

KNITTING.—To H. Warner, of Loughborough, Hosier, C. Hood, of the same place, Frame-smith and Setter-up, and B. Abbot, also of the same place, Frame-work-knitter, a patent for "improvements upon machinery now in use for manufacturing stockings, warp web, warp net, &c." was granted on the 8th of March, and the specification was deposited in the Enrolment Office on the 8th September, 1832.

The object of this invention is stated to be, to simplify the construction, and to facilitate the operation of all machines usually employed in stocking-knitting, by removing the springs, sley, combs, and comb bars, jackwire, half jack joint pieces, the sinker bars, the locker bar with its lockers and thumb plates on locker bar, carriage, &c.; also the usual sinkers and their appurtenances, and introducing another sinker-bar and driver sinkers, placing the ordinary slur bar above the needle bar behind the sinkers. The slur bar is to be placed with its flat side upwards. It is stated that by this arrangement the slur cock may be made to project outwards from the front edge of the bar to the driver sinkers, bringing them more prominent than the lead sinkers; and when the lead sinkers and driver sinkers are so placed that their action shall correspond, and that the slur-cock when drawn along the slur-bar may pass across behind the row of sinkers, and act against the back edges of the driver sinkers. The star bolts pass horizontally over and across the ends of the horizontal bar, removing the pressure bar and all its appurtenances, and introducing filling up pieces of metal rivetted or fastened to the flat sides of the sinkers to fill up vacancies between the adjoining sinkers. The filling pieces are made wedge-shaped above the arches on each of the drawers, that they may act on the beards of the needles.

The principal motions are effected through the medium of cams and eccentrics, but without minute drawings, which we have not an opportunity of introducing at present, of the different parts of the stocking frame as improved by Mr. Warner, all the details of his invention cannot be fully explained to readers not acquainted with the construction of machines of this class.

FURRIERY.—To J. Walmsley, of Manchester, Silkwinder, a patent for "a machine for cutting off the fur or hair from beaver or other skins," was granted on the 15th of March, and the specification was deposited in the Enrolment Office on the 15th of September, 1832.

The claims of this patentee is for the application of small fine cut file sharpeners to the cutters during their motion, so as to keep them continually in perfect order; and also the arrangement of the whole machine, which he describes to consist of the following principal parts.

A pair of drawing rollers slightly fluted and kept together by means of a loaded lever, to prevent the skins under operation from slipping between them: a metallic block on which the portion of skin immediately under the operation of the cutters bears to regulate the closeness of the cutting; a cutter frame with appropriate guides to steady its motion, which is effected by means of a jointed connecting rod, extending from it to a crank on the main shaft, adjustible to regulate the motion of the cutter frame to any required length of stroke. The drawing rollers, the supporting block, and the cutter frame, are placed parallely to each other, but the axis of the fly wheel is placed at right angles to these that it may be in the right position to communicate the traversing motion to the cutter frame; motion must therefore be communicated from the main shaft to the drawing rollers through the medium of any of the well-known places of changing the direction of motion.

PROPELLING VESSELS.—To B. Woodcroft, of Manchester, Printer, a patent "for improvements in the construction and adaptation of a revolving spiral paddle for propelling boats and other vessels on water," was granted on the 22d of March, and the specification was enrolled in the Rolls Chapel Office on the 22d of September, 1832.

The nature of this invention is stated to consist in a spiral worm, blade, or screw, coiled round a shaft or cylinder, in such form that the angle of inclination which the worm makes with the axis of the cylinder, continually decreases, and the pitch or distance between the coils or revolutions of the spiral continually increases throughout the whole length; the effects of which arrangement the patentee asserts are as follows. The spiral paddle being made to rotate in the water, when the commencement of the spiral blade, or that part of it which forms the greatest angle with the shaft acts upon the water, gives to it an impetus or mo-

tion towards the back end of the paddle, thus creating a current in the direction of the spiral. If this current were to reach the succeeding, or following parts of the spiral paddle, before those parts take their action upon the water, such following parts would move in, or keep pace only with, the current, and would therefore make little progress.

The drawings annexed to the specification exhibit several modes of applying this apparatus to different formed vessels. A spiral propeller similar to that sketched in fig. 1, Pl. XX., is shewn as applied to each side of a vessel under the quarters; *a a a* being the worm wound round the axis *b b b*, which turns in fixed bearings *c c*; to the hind extremities of the axis *b* is fixed a crank arm *d*, which is made to rotate by a reciprocating rod *e*, actuated at the stern by the engine inside the boat. Fig. 2 exhibits a stern view of a boat having two such propellers as that described, and being marked with similar letters of reference as far as they apply, requires no further explanation.

Our fig. 3 exhibits another, and a very remarkable mode of applying the spirals: *f g* represent the outline of a side view of the stern quarters of a vessel adapted to receive a pair of these propellers on each side of the rudder, one being above the other, as *h* and *i*, in each pair; and these are made to revolve in *opposite* directions, by means of spur gear *j k*, placed on their axes of motion. The patentee informs us that this arrangement produces a good effect, and that the action is similar to that of a forcing pump; owing, we presume, to the circumstance of the spirals being different, one being a left and the other a right-handed one, which causes them to turn in contrary directions and equally, to propel. In fig. 4 is shown an arrangement of four propellers in one horizontal line, and fig. 5 exhibits three propellers, the centre one having a reverse motion to those on the outside. The following instructions are given by the patentee to form the curve of his spirals.

Let I J, fig. 6, be a right line equal to the direct length of the spiral part of the paddle required, and on I J describe the square I J K L; draw a diagonal line from the angle I to the opposite angle L, which line will form an angle with the line I J of 45 degrees; then divide the side I K of the square into four equal parts, as at 1, 2, 3, 4, and through the point I of the square draw the line I *e* at an angle of 55 degrees: where the line I *e* intersects the horizontal line *c d* at the point *h*, it gives a point through which the segment of a circle *f g* must be drawn from

the angle I to the angle L of the square I J K L. If then the paper upon which this segment of a circle *f g* is drawn, be transferred to, or rolled upon a cylinder, the radius of which is equal to the radius of the spiral worm, the segment of a circle *f g* will describe upon the surface of such cylinder the outer circumference of the spiral worm required.

STEAM ENGINE.—To J. Beale, of Church Street, Whitechapel, Engineer, a patent for "improvements in steam engines," was granted on the 28th of March, and the specification was deposited in the Enrolment Office on the 28th of September, 1832.

In this invention the cylinder is made to move upon a hollow fixed piston rod, with a stationary piston fixed on the middle of the piston rod. The end plates of the cylinder are furnished with stuffing boxes working steam tight upon the piston rod during the alternating motion of the cylinder thereon. The steam is admitted into the cylinder through the upper end of the hollow piston rod, and allowed to pass out through the other end into a condenser, or into the atmosphere, according as the steam is worked for condensation or at high pressure. The piston is to be firmly fixed upon the middle of the piston rod, and it is furnished with four valves connected together in pairs, that the induction and eduction communications may be simultaneously opened and closed. Two stems project from those valves to be acted upon by the top and bottom plates of the cylinder as it is alternately elevated and depressed by the force of the steam. Into the hollow piston rod is introduced where the piston is fixed a block, or a pair of disks, to prevent the passage of the steam right through the rod. Immediately over this steam stop is made a passage through the side of the piston rod for the admission of the steam into the upper part of the cylinder for the purpose of raising it, or into the lower part for the purpose of depressing it according to the position of the passage valves, while immediately under the steam stop another opening is made through the piston rod for the escape of the steam from the lower or upper parts of the cylinder according as it is ascending or descending. These arrangements will however be better understood by inspecting the diagram at fig. 7, Pl. XX., where *a a* represent the working cylinder, which is so in reality, as it, by the pressure of the steam, rises and falls, and by that means communicates motion to the fly wheel, while that of the common engine is only nomi-

nally a *working* cylinder, as it remains stationary, and makes its piston do the work. *b b* represent the hollow piston rod, which receives steam through the valve *c*, from a generator in connexion with the pipe *d*. The lower end of the hollow piston rod forms an eduction pipe for conveying the steam after it has performed its work to a condenser, or to the atmosphere according as the engine is worked at low or high pressure. *ff ff* are two stuffing boxes, fixed on the top and bottom plates of the cylinder, and fitting by packing of the usual construction steam tight upon the exterior of the piston rod during the ascent and descent of the cylinder. *g g* is a piston of the usual construction, except that it has four steam passages right through it marked *h h' h'' h'''* besides four lateral passages marked *j j'*, serving for the passage of steam between the piston rod and the piston. Each of the two vertical passages is furnished with a double stop valve, represented by *i i' i'' i'''*. The disks of the valves *i i''* are within the top and bottom plates of the piston, with two small stems projecting through them, and the disks of the valve *i' i'''* are placed without the top and bottom plates of the piston, as shown in the drawing. *k* is a valve for admitting the steam to start the engine, and preventing its passage when required to be stopped. The valve *k* is connected by means of a rod passing through the stuffing box on the pipe with the lever *l l*, by which the valve is opened and closed. *m* is a bar bent to a rectangular position, having one of its ends *n* passing under the inner arms of the lever *l*, and its other end connected by means of the spiral spring *o*, with a fixed point as at *p*. *q* shows the fly-wheel axis furnished with two cams *r r*, placed in opposite sides, by which the bent rod *m* is alternately elevated and depressed, by which, through lifting the inner end of the lever *l*, the steam is cut off at any required part of the stroke. *r r* show the framing of the engine, which of course may be varied at pleasure. In the present position of the cylinder the steam will pass through she lateral hole *j*, and through the vertical opening into the upper part of the cylinder, the passage *h''* being closed; while the steam in the lower part of the cylinder will pass through the passages *h'''* and *j''*, and escape at the bottom of the piston rod. By this action the cylinder will evidently be forced upwards, till the bottom plate of the cylinder comes in contact with the lower parts of the valves *i i*, by which the whole of the steam passages connected with the piston will be reversed, when the cylinder will be forced down, and thus an alternating motion of the cylinder will

be obtained, which being connected with the cranked shaft of the fly-wheel, communicate the power wherever it may be required.

MANGLE-WURZEL.—To P. Young, of Fenchurch Street, London, Rope and Sail-maker, a patent for " a new mode of manufacturing mangle-wurzel, for the purpose of producing certain known articles of commerce," was granted on the 22d of March, and the specification was deposited in the Enrolment Office on the 22d of September, 1832.

The articles of commerce proposed to be produced from mangle-wurzel are, first, liquor fit for the use of the distiller and spirit dealer; secondly, liquor fit for the use of the vinegar manufacturer; and, thirdly, a pulp fit for the use of the paper manufacturer.

The mangle-wurzel is first to be cleansed by washing, brushing, scraping, and rashing. It is then to be inclosed in woollen or hair cloths, and the juice forced from it by the application of a hydraulic or other powerful press. The juice is then to be collected and placed in a copper or boiler and heated to nearly 110° of Fah. Diluted sulphuric acid in the proportion of about ten oz. to a hundred weight is then to be added by degrees, and the mixture gradually cooled down to 60° or 70° Fah. Yeast is then to be added in the proportion of one per cent. The liquor is now to be fermented and attenuated by the addition of the least possible quantity, which will answer the purpose of malt and common wash: the acid to be employed is to be diluted in the proportion of one part of acid to five parts of water, and ten oz. of the mixture applied to 100 gallons of liquor.

The residue of the mangle-wurzel left in the press after the juice has been expressed is to be employed in the manufacture of vinega rby adding to one tun of it a hundred gallons of cold water, and applied with saccharine matter to the production of vinegar, according to the process usually adopted in the manufacture of that article.

The fibrous refuse of this manufacture is now to be prepared for the paper maker by the application of a bath, consisting of water and acid in the proportion of a hundred gallons of water to two pounds of acid. It is then to be bleached by the application of sulphuric acid gas or chlorine, in the usual manner; and the pulp thus obtained is to be mixed with that, or rags, or hempen materials, in the proportion of from 10 to 50 per cent, according to the quality of paper required.

PRESERVATIVE.—To J. H. Kyan, of South Row, Euston Square, Esq., a patent for "a new mode of preserving certain vegetable substances from decay," was granted on the 31st of March, and the specification was deposited in the Enrolment Office on the 28th of September, 1832.

A very few words will suffice to explain the nature of this invention, and the manner in which the same is to be performed. The vegetable substances to which it is stated to be more especially applicable is woods of various kinds, which are to be by its application preserved from *dry rot* and other sources of decay. The invention consists in the application of a solution of dutoxide of mercury, or corrosive sublimate in water, to the substances to be preserved. The proportion stated by the patentee is one pound of the corrosive sublimate to five gallons of water. In this solution the material to be preserved is to be completely immersed, and kept in a trough or other appropriate vessel for a length of time, which must be varied according to the nature of the wood under the operation. The harder and less porous the wood may be, the more time will be required in communicating to it a sufficient dose of the preservative.

The claim is stated to be for the application of the dutoxide of mercury in the manner described, to the preservation of vegetable substances.

CARDING.—To M. Bolton, of Sharples, Lancashire, Carder, a patent for "an improvement in machinery used for carding cotton and other fibrous materials," was granted on the 5th of June, and the specification was deposited in the Enrolment Office on the 5th of August, 1832.

This invention consists in a process for removing seed, dirt, and other extraneous matter from cotton and such other fibrous materials as are subject to the process of carding, and while they are undergoing that process, by the application of a knife-edged blade to the carding machinery used on such occasions, furnished with a receptacle which receives the said matter when so removed as aforesaid.

The main cylinder, the feeding roller, and the doffing cylinder, are all arranged as in the ordinary manner of arranging machines of this description; and the improvement is introduced in the part between the top cards marked, and the doffer cylinder. It consists of a wooden trough or receptacle, which must be made of a triangular form, in order, in some sort, to fit the situation

here assigned to it, the flat side being uppermost, and the two concave sides placed one towards the main cylinder, and the other towards the doffing cylinder. Two ends or arms project from the trough by which it is fastened to the framing of the machinery. The end of the metal knife-edged blade is also fastened to the frame, and bent or cranked, in order to bring it nearer than the trough to the material on the main cylinder of the machine. The exact distance at which the knife-edged blade should be placed from the points of the wire of the main cylinder depends, in some measure, on the nature of the material to be carded, and it will be easily ascertained by experience. But in all cases it is recommended to apply the blades at a tangent to the circle or periphery of the carding cylinder, with the knife edge of the blade set to meet the motion of the cylinder. In cotton, of the quality called Orleans, it is found about one-sixteenth of an inch distance from the wire points on the cylinder to answer well; the blade should be always set parallel to the axis of the main cylinder.

In the drawing annexed to the specification are represented only one blade applied to a carding engine, which is rather more convenient than a greater number, if the cotton or other fibrous material is sufficiently cleaned by its action; but where more blades are required, it has been found convenient to remove two or more of the top cards, and place a succession of blades in that direction; but this addition of a greater number of blades, together with their relative position to one another on the cylinder, must depend on the construction of the carding engine, and the nature of the material to be carded.

The size of the blades and troughs or receptacles used in this invention, and adapted to a carding engine of the ordinary construction, in which the main cylinder is of a diameter of about thirty-six inches, is about nine inches wide. During the process of carding, the trough, with the blade, is covered up by means of a lid which is attached by hinges, or otherwise, to the top rail of the trough to prevent the escape of the small portion of cotton, or other fibrous material, which may be struck off by the knife edge of the blade, and it is the duty of the stripper, or person employed to clear the top cards, in going his usual rounds, to open the lid and remove any cotton or other fibrous material which may have accumulated, as often as may be necessary; as also the seed, dirt, or other extraneous matter which collects at the bottom of the trough or receptacle. The knife-edged blade is screwed to the

front of the trough, besides being fastened at its ends to the framing of the machine: this is necessary if the blade is not made very strong in the back, as the more firmly it is kept in a perfectly straight line across the cylinder, the better. Now, though the situation of the blade, which is found. by present experience, best suited to the purposes of this invention, is that shewn in the drawing annexed, yet the patentee is aware that it might be placed elsewhere on the machine with very good effect.

But the patentee claims as his invention the application of a knife-edged blade, furnished with a trough or receptacle to the machinery used for carding, for the purpose of removing and collecting seed, dirt, and other extraneous matter from cotton, and such other fibrous substances as are subjected to the process of carding, while they are undergoing that operation.

MEDALS.—To J. Bate, of the Poultry, in the City of London, Optician, a patent for an improvement on machinery applicable to the imitation of medals, sculpture, and other works of art executed in relief," was granted on the 9th of April, and the specification was enrolled in the Petty Bag Office on the 8th of October, 1832.

The improvement alluded to in the foregoing title is a very beautiful instrument for transferring a faithful imitation of medals, sculpture, and other works of refined art, on to copper or steel plates. A tracing point being conducted by the workman or artist over the irregular surface of the subject, fixed vertically in a frame for that purpose, communicates corresponding motions in an horizontal plane to an etching point, which rests upon the surface of the metal plate to be etched. It being impossible, however, to afford a correct notion of the mechanism by which this is effected without an illustration, we have given a sketch (from memory) of the machine at fig. 6, Pl. XIX.; where *a a* represent a portion of the table, to which is screwed a standard *b*, that receives the medal *c*, or other subject to be copied. To this table is also fixed a brass socket *d d*, in which a bolt *e*, fitted to it with great accuracy, is made to slide up and down by the agency of a fine threaded screw *f*, provided with a micrometer head at *g*, for the purpose of adjusting the motion through equal spaces. The vertical bolt *e* is surmounted by a strong plate or guide frame *h*, fixed to it in an inclined position; on the upper edge of this frame is a groove, in which run two or more rollers or little conical edged wheels (as that seen at *i*) fixed to the under side of the

upper part of a carriage j: this carriage has another roller at bottom, marked k, which runs upon a flat plate bolted to h. This carriage, made of brass, has a flat steel plate $l\,l$ passed through it with conical edges moving against anti-friction rollers, and to the upper edge of the steel plate is fixed the tracing point m, as will be hereafter more particularly described. n is a standard fixed to the tracer carriage, bearing a three-armed piece $o\,p\,q$; the lower extremity of the arm o being jointed to a bar, which carries the etching point r over the copper or steel plate s, lying on its carriage $t\,t$ running upon a metallic stage $u\,u$. v is a metallic arm fixed to the socket d, and connected by a steel chain $w\,w$ to a stud x in the underside of the plate carriage; to this stud is also attached a silken cord passing over a pulley at y, suspending the weight z; the province of this weight is to draw the carriage plate backwards, as the tracing point passes over the projections of the medal, while the chain w draws the carriage forward as the tracing point passes into the cavities.

In cases where the descent into cavities is perpendicular, or nearly so, to the plane of the middle, neither the common conical point, nor the tapering blade m, will reach the required spot; to obviate this difficulty, the patentee has inserted a very ingenious tracer of the blade form delineated in fig. 7. a is the blade having an axis b, with the centre of motion coincident with one straight edge of the blade; $c\,c\,c\,c$ represent a socket into which the pivot b of the blade fits with great accuracy, but made to turn with facility; the nut d keeps the tracer up to its bearing to prevent its shaking longitudinally. It is evident that this form of tracer will admit of its being passed down the perpendicular sides of any declivity in whatever direction the perpendicular side may be.

In former instruments constructed for this purpose, the point is moved in a plane perpendicular to the plane of the medal, whereas Mr. Bates's is moved in a plane oblique to the plane of the medal. The correction consists in making the line described upon the copper to deviate an equal quantity from the straight line upon the copper as the tracer is diverted from a plane perpendicular to the plane of the medal. The relative direction of the motions required to produce this effect may be described a right angle triangle, one motion being in the plane of the base, a second in the plane of the perpendicular, and a third in the plane of the hypothenuse, or in planes parallel to their several planes respec-

tively, and the proportion of apparent elevation in the engraving will be to the elevation in the medal itself, as the proportion of the base of the triangle is to its perpendicular.

The peculiar claims to invention under this patent are first, the oblique motion of the tracer; and the substitution of a tracing blade in lieu of the ordinary conical tracing point.

In a recent number of the Journal of the Franklin Institute some observations are made on this subject which we subjoin for the information of our readers; and we trust that it will appear to our American friends that Mr. Bates introduced a considerable degree of originality into his machine.

On the invention and progress of Medal Ruling in the United States. By the COMMITTEE OF PUBLICATIONS.

During the time when communication, even between neighbouring nations, was not common, similar inventions were frequently made independently in several different countries and at different times: hence, in the progress of information, perpetual disputes arose as to originality, or priority, and much crimination and bitter feeling were produced.

America *has been* without her journals to put forth the claims of her ingenious men, and the credit of more than one invention has passed from her to those who have been able to give greater publicity to their designs; but this day has passed away, and we find notices of the ingenious works of our countrymen transferred to the pages of foreign Journals to be appreciated and acknowledged abroad as well as at home.

We propose briefly to set before our reader a correct history of the invention of a *machine for straight and waved lined ruling, and for medal ruling*, which the impressions conveyed by the following paragraphs appear to render necessary.

Extract from the proceedings of the Friday evening meetings of the Royal Institution of Great Britain, as given in the Philosophical Magazine and Annals of Philosophy for April, 1832.

" *February* 3rd.

" Afterwards the beautiful machine constructed by Mr. Bate, of the Poultry, for producing engravings of medals by machinery applied to the surface of the medal itself, or to that of the cast from it, was shown and explained by Mr. Faraday. Drawings would be required to make the description intelligible here. A plate was partly engraved, and many impressions from other plates were shewn. Mr. Bate is still engaged in perfecting this instrument."

We are not told who *invented* this machine, but Mr. Bate's

claims appear more distinctly in the terms of a patent which he has taken out.

"John Bate, of the Poultry, optician, for an improvement or improvements on machinery applicable to the imitation of medals sculpture, and other works of art, executed in relief; six months: April 9."—(*Mechanics' Mag.*)

Believing that the credit of the invention of a machine for medal ruling is due to America, we will briefly set forth our proofs, and then speak of the improvements which of late years the method has undergone.

The proofs to be given of the existence and state of a machine are to be derived from the results produced by it.

In 1817, by the use of a machine which had been invented in Philadelphia, Christian Gobrecht, die-sinker, produced upon copper an engraving from a medal, having upon it the head of Alexander of Russia: from this engraving impressions were taken and distributed. One of these impressions we have seen.

In 1819 Asa Spencer (now of the firm of Draper, Underwood & Co. bank-note engravers,) took with him to London a machine of the kind above alluded to, which was designed principally for straight and waved line ruling. This machine was used in London during the year just mentioned, and the mode of ruling waved lines, and of *copying medals*, was then exhibited and explained by Mr. Spencer to several artists; particularly to Mr. Turrell, who took, by permission, a drawing of the machine, for the purpose of having one made for his own use.

Little, however, was done in the way of medal ruling until about three years since, when a desire to apply the method to the engraving of designs for bank notes caused it to be revived by Mr. Spencer, who bestowed great attention upon it, and overcame the difficulties met with in the outset.

The peculiar construction of this machine has never been made a secret, nor has it ever been patented, although prudential motives have required that it should not be minutely described, and thus be placed in the hands of those by whom its use might be perverted. In consequence of this free communication in relation to this machine, it is now made, with modifications in the details, for engravers, by some of our machinists. We have lately had the pleasure of inspecting one of beautiful workmanship, made by Messrs. Tyler, Fletcher, & Co.

The operations performed by this machine are the ruling of parallel straight lines at any required distances apart, and either continuous or broken; ruling converging straight lines; ruling waved lines, the waves being either similar or varying by more or less imperceptible gradations; and medal ruling, or transferring to copper the fac-simile of a medal without injuring its surface, the waved lines presenting a copy of the minutest parts of the medal.

Mr. Bate is said, in the extract which we have given, to be engaged in *perfecting* a machine for medal ruling : in his patent he claims the improvements on a machine for that purpose. It is impossible to say how far this latter claim may be borne out, since a description of the patented improvements has not yet reached us.

That Mr, Spencer has essentially *perfected* this machine as far as beauty of execution, and fidelity of representation in the work to be done by it are cencerned, we do not hesitate to say, and that the public here, and our brethren of England, may be enabled to judge for themselves, we have obtained from Mr. Spenser a specimen* of medal ruling executed with his machine, an impression from which we give.

The engraving is made from a copper medal placed in an embossed card of the ordinary kind. The surface of the medal bears not the slightest trace of injury from the machine, and even the yielding surface of the card is not roughened by it

An impression taken thus from a plate gives but a faint idea of the exquisite effect produced by engravings themselves made by this machine upon a polished surface of gold or silver.

A series of the Napoleon medals, together with a portion of the series of medals struck in commemoration of the events of the first French revolution attest the skill of Mr. Spencer.

If even claims to improvement upon this machine should be established, we trust that what has been here advanced in relation to the invention and progress of medal ruling in this country, will neither be overlooked or forgotten.

A. D. B.

MECHANICAL ARTS.

The following paper, which has accidentally fallen into our hands, containing many judicious remarks on a very important subject, we have thought proper to lay before our readers :—

On the advantages and means of re-opening a Gallery for the Periodical Exhibition of Specimens of superior, improved, or new Manufactures; of novel Mechanical Inventions; and of Models and Drawings, illustrative of the State and Progress of the Mechanical Arts,

The stimulating and fostering effects of competitive exhibitions on talent devoted to one class of art—namely, that which embraces Painting, Sculpture, and Architectural Design—are sufficiently ob-

* Various specimens of this work have been long since sent to London, and may be found in the possession of Messrs. Perkins and Heath, and of other artists.

vious to every one who compares the state of the Fine Arts in this country at the present day, with the low condition in which they were somewhat more than fifty years ago. By the influence of these public displays, the common fund of practical knowledge has been open to the demands of every individual artist; the acquisition of technical skill has been reciprocally accelerated; taste has been mutually refined; the artist has been more readily and more completely formed; his patron has been made a more accurate and more facile judge; talent has been developed in greater perfection through a wider circle; and the demands for its exertions have been multiplied a thousand fold. So strongly felt by the Professors of Art themselves are the advantages accruing to them from these periodical displays of their works, that we now see, year by year, new places of exhibition opening by the combined exertions of artists alone.

The same means which have expanded and refined—which have amplified the resources and extended the field of exertion of one kind of productive talent in the country, cannot fail to exert on another, where similarly directed, an equally beneficial influence. The Mechanical Arts are as susceptible of public culture, as are the arts more especially dependent on imagination, feeling, and taste. The Fine Arts, as lending themselves more directly to the ornament and distinction of high station, have received royal and noble countenance and support. The Mechanical Arts, on which so much of our country's greatness depends, as far as concerted directive influence is concerned, have been abandoned to their intrinsic energies; they have been left to expand or to wither by the genial or the baneful influences which the casual circumstances of trade have generated. The influences thus springing without design, have not unfrequently a tendency to national detriment, and call for the correctional intervention of enlightened judgment and comprehensive views. Degradation of productions is a common effect of, and seems almost naturally to result from, the fortuitous and uncorrected influences of trade. The cupidity of unscrupulous dealers is ever stimulating producers by secret artifices to a self-destructive competition. They begin their practices with the needy and those of feeble honesty, and climb stealthily, but surely, to the opulent and honourable manufacturer. The man of integrity is brought by these arts, in self-defence, to compete with the knave in the vitiation of products. But deterioration of quality, under the specious show of cheapness, inevitably undermines the character of national manufactures, and lowers the standard of productive skill. England is now known, in many parts of the globe, only as the producer of the vilest, most unsubstantial and trashy, but low-priced commodities. The conduct and practices of many manufacturers, engaged in productions avowedly for the export trade, tend daily to the further debasement of this already low character. Practices more nationally noxious, and policy more short-sighted, can hardly be conceived; competition, sooner or later, will inevitably come from a less corrupt source. Progressive improvements in mechanism and manipulations

are constantly lowering the cost of production in the great branches of manufacture. This is of common benefit, as rendering consumable articles at less expense to the community; but direct and forced competition *merely* in lowness of prices, leads generally to public detriment and injury: for its first aim is to confound cheapness and low price, by putting a better face on an inferior article; and it proceeds to undermine quality through all the grades of production, by aiming at a marketable appearance above the sterling value of the commodity in every instance. The consumer's interests are doubly sacrificed to this system of delusion. The cost to him, of the inferior quality, is enhanced by the absolute cost of the deception; and as he pays a profit on materials, and on all the labour employed on them, he is made to pay for that which is designed to do him wrong. Besides, a higher rate of profit is frequently realised on the bad than on the good commodity. The purely sordid contest of manufacturers goes directly to the debasement of moral character, to the vitiation of productive talent, and to the eventual decline of manufacturing industry. It becomes a public duty to instigate to a more honourable emulation.

The progress of opulence and refinement in advanced communities, calls for correspondent progression in the excellence and finish of all the subsidiary necessaries of such an improved condition of society. Wealth demands, and is ready to compensate, the highest efforts of productive skill; it is characteristic of a state of general refinement to encourage, by direct incitements and by the sedulous extinction of hindrances, the best exertions of productive talent.

The opulent of our own country covet the very finest productions of the manufacturer and of the artisan; and they are told, and seem to imbibe the belief, that a great many productions of that higher order are, and can only be expected to be found, in the warehouses and workshops of foreign countries. The fact is unquestionable, that, at this day. there are elaborated in foreign countries, some of the more refined manufactures, deriving their excellence from the taste, care, delicacy, and assiduity of the individual artisan, which surpass, in quality and in exquisite finish, productions of the like kind from our own workmen. But this need not, nor ought it to be. We have all the elements of manufactures as vigorous and as prolific as they can elsewhere be found. This disparity of products must not be imputed to an incapacity of our native artisans for the requisite nicety and skill; it is a fault of training merely; their attention has been directed to an object different from that set before the foreign artist; they have been urged to produce a cheap article; the foreigner a perfect one. Give encouragement, and direct his emulation into the right channel, and the productions of our native workman will quickly rival the most vaunted products of foreign skill. Our fine cutlery—our highest class of cabinet-work—our best watch-work—evince taste, precision, nicety, and patience of pursuit, adequate to the accomplishment of any, the very finest objects of fabricative skill

Commensurate in importance to the national interests, with the soundness and perfection of our manufactured produce, are the number, power, and accuracy, of our mechanical contrivances. Inventors of new, and improvers of already-adopted machines, deserve every encouragement in a community engaged largely in manufactures. Equally incumbent on such a community is it, to cherish and compensate the skill, taste, and dexterity, of the individual artisan. The productions of these two classes must ever find ready access into a Museum of the Mechanical Arts of this country.

There can be no more efficacious mode of advancing the producer's interest, than by introducing him, through his works, immediately to the notice of the ultimate purchaser of his produce. There can be no less objectionable mode of effecting this intercourse, than that which is divested of the possible bias of intervening interests. In an open exhibition the works alone speak, the judgment is assailed by no sinister influences. An open exhibition generates honourable emulation—excites to healthful competition—corrects prejudicial tendencies, and puts out of countenance deception and fraud.—In an open exhibition the public gains knowledge, refines its taste, and matures its judgment. The advantages flowing from such an establishment, are not less sterling and wide-spread to the consuming, than they are to the producing, part of a community: both necessarily profit.

These were the objects of inestimable value to our country, in association with Manufactures and the Mechanical Arts, which fixed the attention of the enlightened and public-spirited supporters of the National Repository. The imperfections incident to a new establishment in an untried walk were scarcely corrected, when the operations of that institution were abruptly arrested by the resumption of its premises by the Board of Ordnance. The magnitude of the public interests, involved in the successful development of the plan of the institution, should have provided for its localization upon a less precarious tenure. The objects contemplated tend to the extension and perpetuation of the national resources; their attainment, through the means proposed, are too easily practicable to allow this unlooked-for interruption to weigh any thing in the consideration of the policy of their prosecution.

The experiment already made has sufficed to show, that the plan hitherto pursued has force *de se*, under prudent administration, to accomplish its ultimate aim. Through the infant stage of the institution, the pecuniary produce of the periodical Exhibition has been equivalent to the necessary expenditure. The former premises, granted by a Government Board, required a large outlay from the funds of the institution to put them into tenantable repair; the brief tenancy allowed after this repair was effected, converts the disbursement into a heavy annual charge. The augmented expenditure to be anticipated from an occupancy of premises of private property, at a rent certain, is too unimportant to militate against the successful prosecution of the plan, and will surely be amply compensated by the superior certainty of possession.

All that is now wanted for the re-establishment and future maintenance of an institution, to carry to maturity the design of the National Repository, is a very moderate fund for fitting up a suitable building: from £1,500 to £2,000 will amply suffice. The future effective working of the plan is mainly ensured. The productive classes have been awakened to a conviction of their own peculiar interest in the progress of such an institution, and are already prepared to avail themselves of its proffered opportunities. The desire for information and the curiosity of the public, are in full activity to profit by the novelties and instruction of the periodical displays: the imperfections of the first attempt indicate the needful improvements in the organization of the succeeding establishment.

To give character to an undertaking having important public objects in view, it is desirable that it should be conducted under the auspices of men eminent by station, and by their publicly-recognised aptitude for the advancement of similar pursuits. But it by no means appears necessary for its success, to entail upon such men an irksome attention to the uninteresting details of its current business; nor is it equitable to link them so closely with the establishment, as to involve them personally in the risk of pecuniary responsibilities for an institution which they only favour as well-wishers, but from which they cannot, nor do they wish, to derive pecuniary advantage.

It is now proposed, therefore, in order to associate men of eminence and influence with a Museum of National Manufactures and of the Mechanical Arts as its Patrons, to ask assistance of them for its establishment, merely in the way of loan; collectively, to the extent of the specified fund, to be secured to them on the improved premises, and the available property therein, until repaid, with periodically accruing interest, from the income of the institution. The control of the property of the institution, so long as any advanced money remains unpaid, to be vested in Trustees appointed by the lenders. Every patron who may lend £100, to have, at all times, free access to the Gallery for himself and two friends.

To ensure impartiality in the acceptance of objects for display, and to stamp a certain value on the fiat of reception, the judicial functions of the institution it is proposed to commit, as in the former establishment, to a Committee of men of business, conversant, from their individual avocations, with the essentials of excellence in the productions of the different branches of mechanical art.

It is also proposed to vest the general superintendance and management of the establishment in a permanent Director, who will alone be responsible for every pecuniary engagement of the institution, and who will derive his compensation from the excess of receipts above the obligations and expenditure of the establishment.

New Steam Engine.—A Mr. Pellitan is making experiments at Cherbourg, on a vessel which he has built for the express purpose of ascertaining the merits of his simplified application of the powers of steam: and the result is said to have been hitherto satisfactory. His object is to get rid of the shock and tremulous motion which attend the use of paddle-wheels, as well as to do away with the steam funnel. In effecting this, he hopes to be enabled to diminish the weight of the machinery, and of the vessel itself. The mechanism which he has devised lies below the surface of the water, and from not occupying more than a tenth part of the ship's tonnage, much greater space is obtained for the stowage of fuel. The steam is disengaged from behind the after part of the vessel, close above the water line.—*Athæneum.*

List of New Patents Sealed omitted in our last Number.

Collars.—To W. Joyce, of Bow, harness-maker, for improvements in the making or constructing of collars for horses and other animals.—Dated August 22, 1832. Specification to be enrolled in six months.

Puddling-Furnace.—To D and G. Horton, of the Leys Iron Works, Staffordshire, iron-masters and co-partners, for an improved puddling furnace for the better production of manufactured iron in the process of obtaining it from the pig.—September 7. Six months.

Malleable Iron.—G. Jones, of Wolverhampton, iron-master, J. Foster, of Stourbridge, iron-master, and J. Barker and J. Jones, both of Wolverhampton, iron-masters, for an improvement in the process now in use for producing or making malleable iron.—Sept. 8. Six months.

Drawing.—To C. E. A. Burgess, of Beauport, in Sussex, spinster, for an improvement or apparatus for sketching, drawing, or delineating.—Sept. 8. Six months.

Pill Boxes, &c.—To J. O. Mosley and G. Bell, both of Primrose-hill, Salisbury-square, London, dye-sinkers and embossers, for an improvement in the manufacturing of pill and other boxes from pasteboard, paper, or other materials, which improvements are applicable to other purposes.—Sept, 8. Six months.

Cement.—To N. Troughton, of Swansea, copper-smelter, for improvements in preparing the materials for, and in producing a cement applicable to building and other purposes, which he denominates "metallic cement." Sept. 8.—Two months.

Piano Fortes.—To P. F. Fischer, of Chester-place, Regent's-park, gentleman, for improvements in piano fortes. Communicated to him by a foreigner residing abroad. Sept. 8. Six months.

Spinning.—To J. Brown, of Heaton Norris, cotton manufacturer, and T. Heys, of the same place, book-keeper, for an improvement in the machinery used for spinning cotton, silk, flax, and other fibrous substances, commonly called throstles. Sept. 8. Two months.

Tram Roads.—To R. Badnall, the younger, formerly of Ashenhurst-hall, now of Douglas, in the Isle of Man, gentleman, for an improvement in the construction of the frames, or rails, or lines of rail, or tram-roads, upon which locomotive-engines shall or may work.—Sept. 8. Six months.

Carpets.—To R. Whytock, of Edinburgh, for an improved manufacture which facilitates the production of regular figures or patterns on different fabrics, particularly velvet, velvet pile, and Brussels, Wilton, and Turkey carpets.—Sept. 8.—Six months.

Steam Engines.—To R. Trevithick, of Camborne, engineer, for improvements on the steam engine, and in the application of steam power to navigation, and to locomotion.—Sept. 22. Six months.

Preservative.—To J. H. Kyan, of Gillingham-street, Pimlico, Esq. for an improved mode of preserving paper, canvas, cloth, and cordage, for ships, and other uses, and the raw materials of hemp, flax, or cotton, from which the same may wholly or in part be made. Sept. 22. Six months.

Carriage Wheels.—To J. Gibbs, of the Kent-road, engineer, and Augustus Applegath, of Crayford, calico printers, for improvements in machinery for cutting out wood for carriage-wheels, and for cutting and shaping the wheels.—Sept. 22. Two months.

LIST OF NEW PATENTS SEALED.

Candles.—To C. Watt, of Clapham, surgeon, for an improved method of preparing tallow and stuff from fatty materials, and refining the same for the manufacture of candles and other purposes.—Dated Sept. 27, 1832. Specification to be enrolled in six months.

Paper.—To J. Amies, of Loose, Kent, paper-maker, for improvements in the construction of apparatus to be employed in making paper.—Sept. 29. Six months.

Spinning.—To J. Travis, the younger, of Shaw Mills, near Manchester, cotton-spinner, for improvements in machinery for roving cotton and other fibrous substances.—Sept. 29. Six months.

Candlesticks.—To W. Palmer, of George Place, Old Street Road, candle-maker, for improvements in making candles and candlesticks, or an apparatus for holding candles.—Sept. 22. Six months.

Nails.—To J. Joyce, of Sidmouth Street, Gray's Inn Road, gentleman, for improvements in machinery in making nails. Communicated to him, by a foreigner residing abroad.—Sept. 29. Six months.

Brewing.—To J. Swan, of Basingstoke, brewer, for improvements in brewing.—Sept. 29. Six months.

Rail Roads.—To S. Converse, of New York, at present in Ludgate Hill, London, gentleman, for improvements in manufacturing metallic rails for the construction of rail roads.—Communicated to him by a foreigner residing abroad.—Sept. 29. Six months.

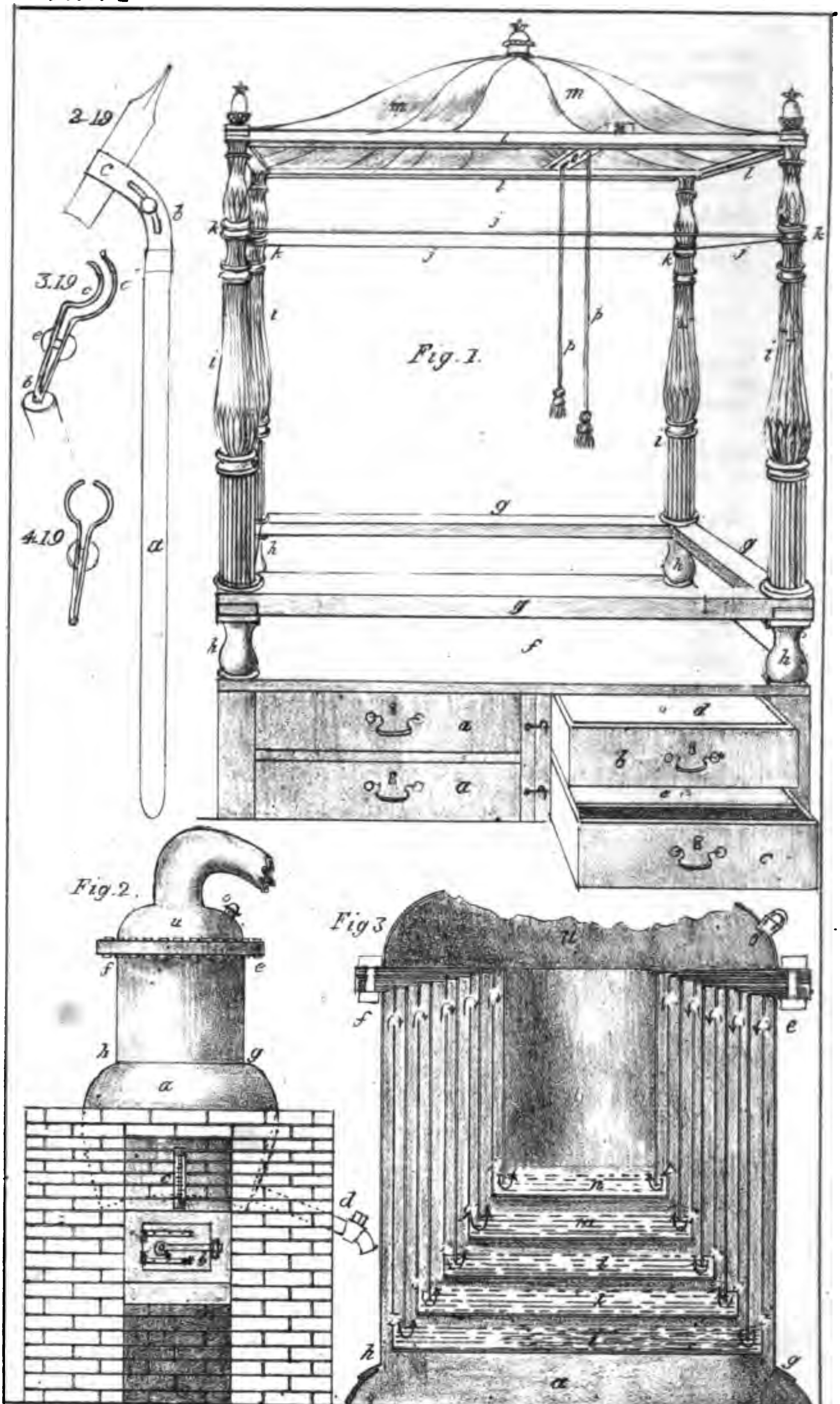
Steam Carriages.—To J. Gibbs, of Kent Terrace, Kent Road, Surrey, engineer, and Augustus Applegarth, of Crayford, calico printer, for improvements in steam carriages.—Sept. 29. Six months.

Pumps.—To. J. White, of Southampton, engineer and iron-founder, for improvements in the construction of pumps or engines for raising water or other fluids.—Oct. 10.—Six months.

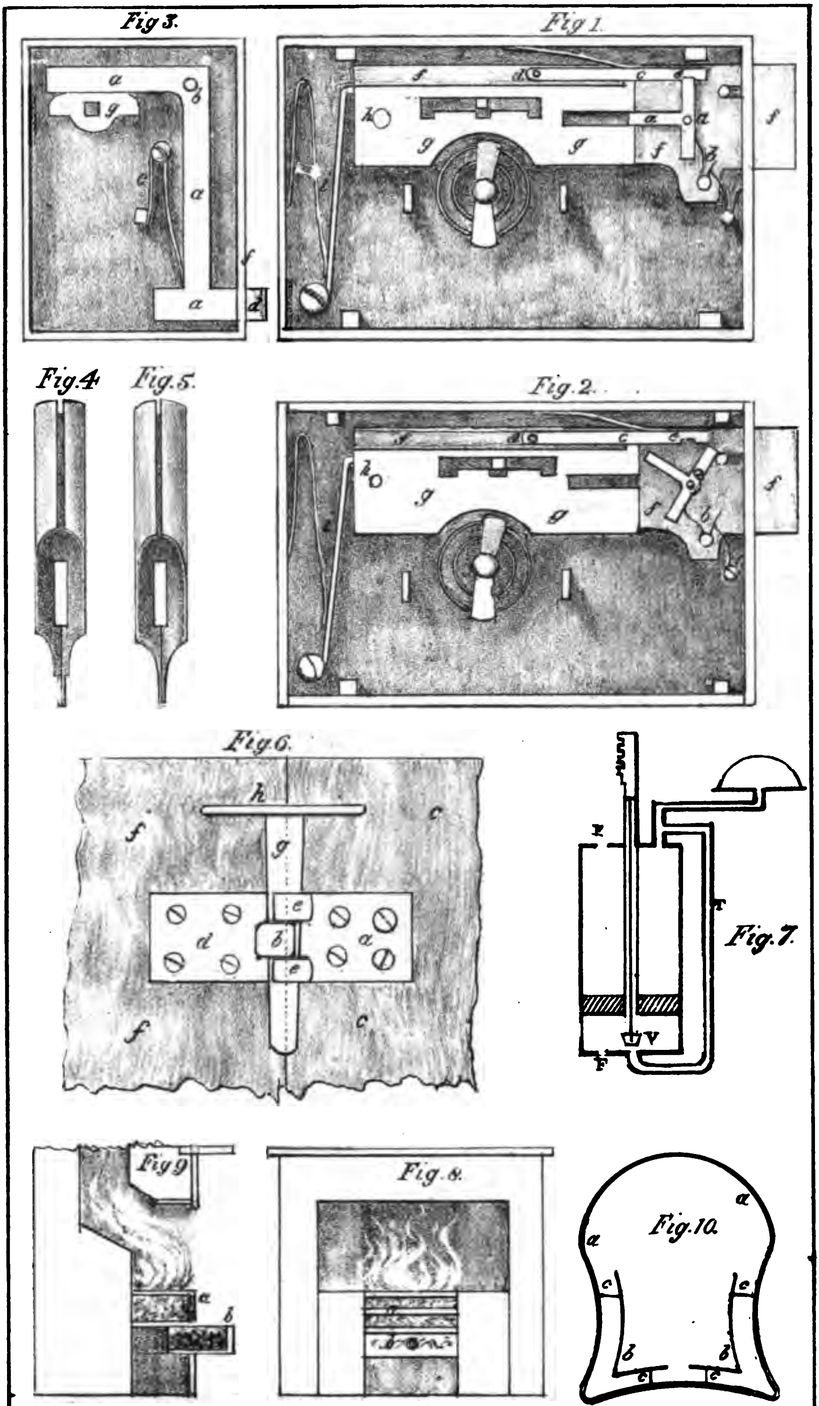
Pens.—To W. Woods, the elder, of Newcastle Street, Farringdon Street, London, steel-pen manufacturer, for improvements in the construction of metal pens.—Oct 10. Six months.

Preservative for Prints.—To J. Durant, of Brewer Street, Somers' Town, St. Pancras, smith, for an improved mode or method of securing and preserving prints, drawings, music, &c. so as to be readily referred to, and capable of being taken asunder and replaced at any time with facility.—Oct. 12. Six months.

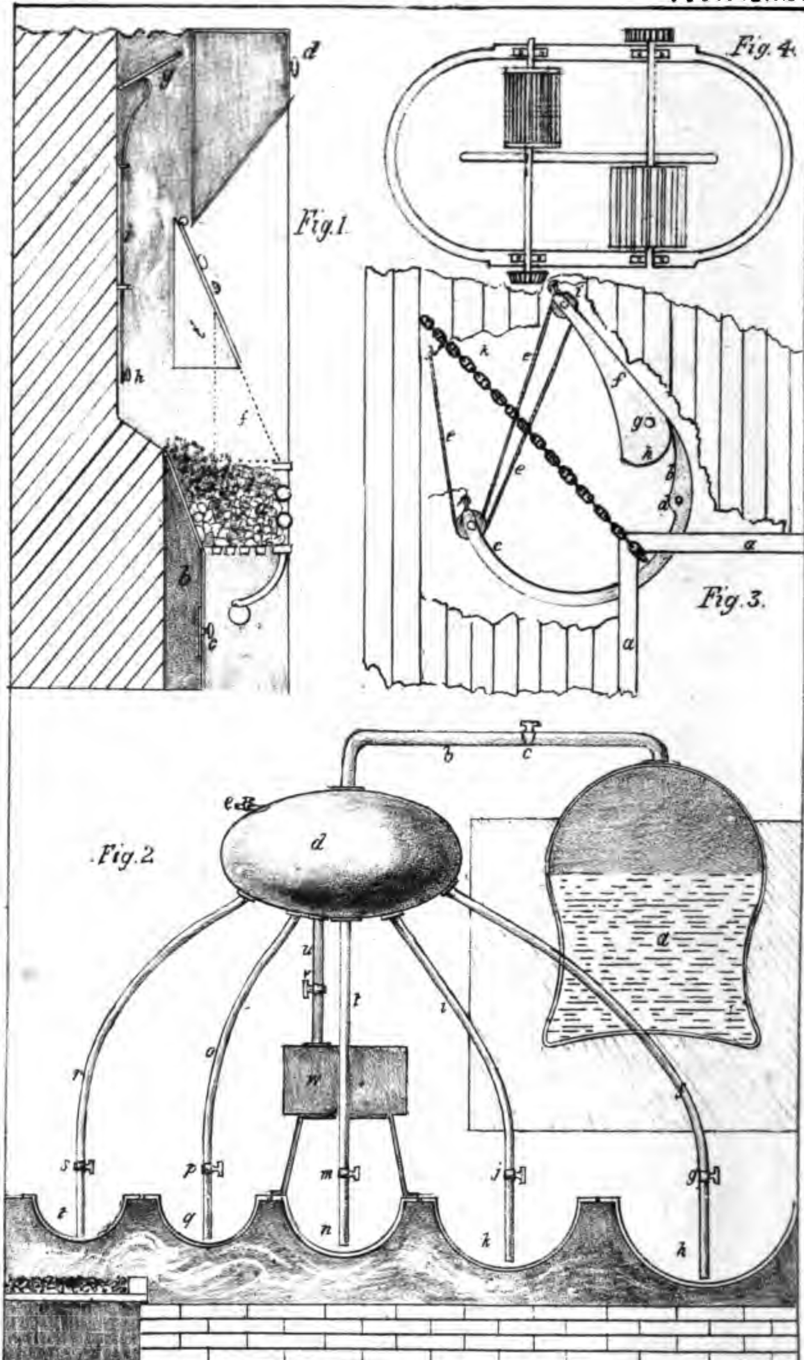
Plate 1 Vol. 7. N.S



Sketched by L. Hebert E. Lake, Lithog 1st Feby. 1832.



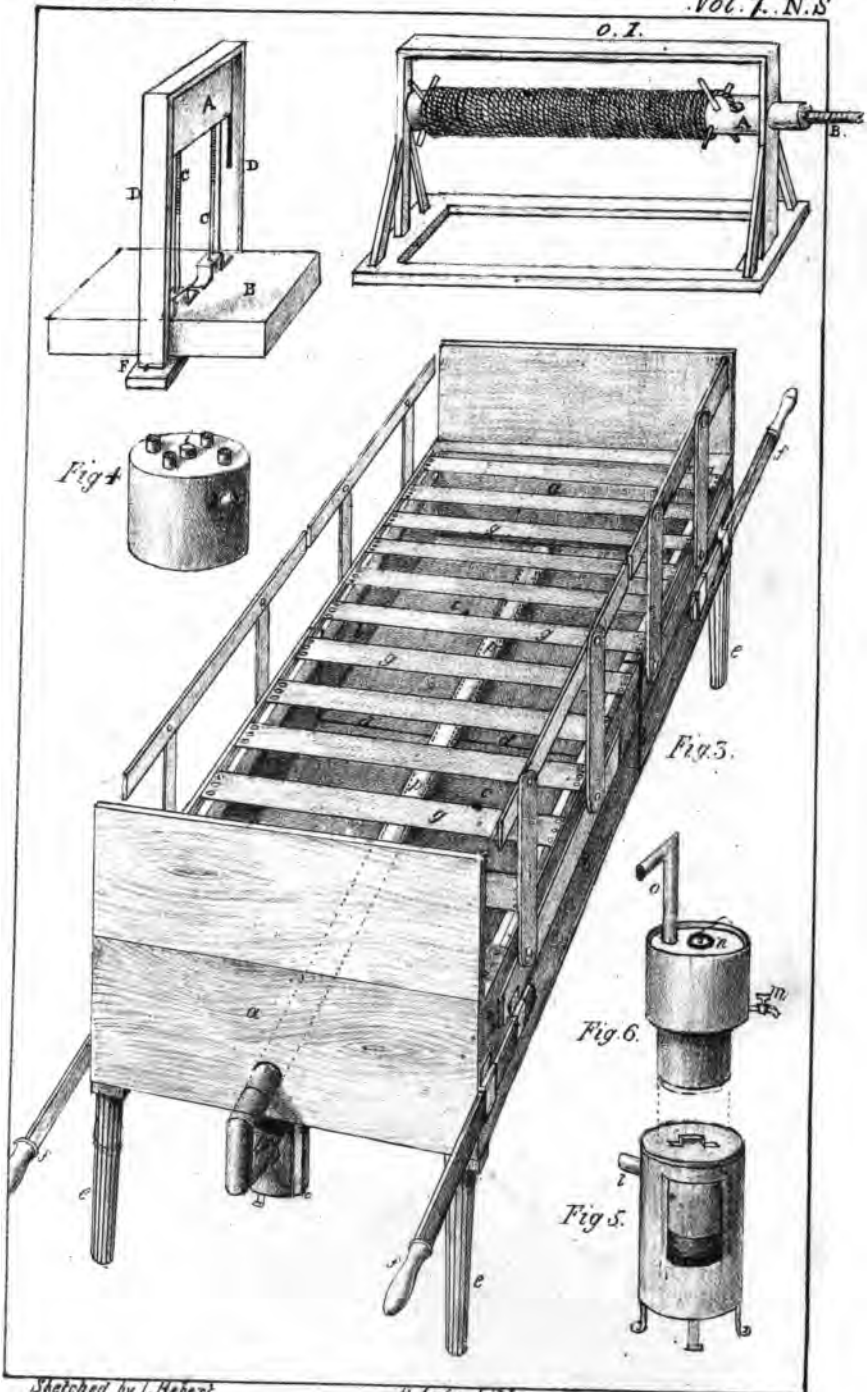
Sketched by L. Hebert. E. Lake Lithog. 1st Feb. 1832



Sketched by L. Hebert

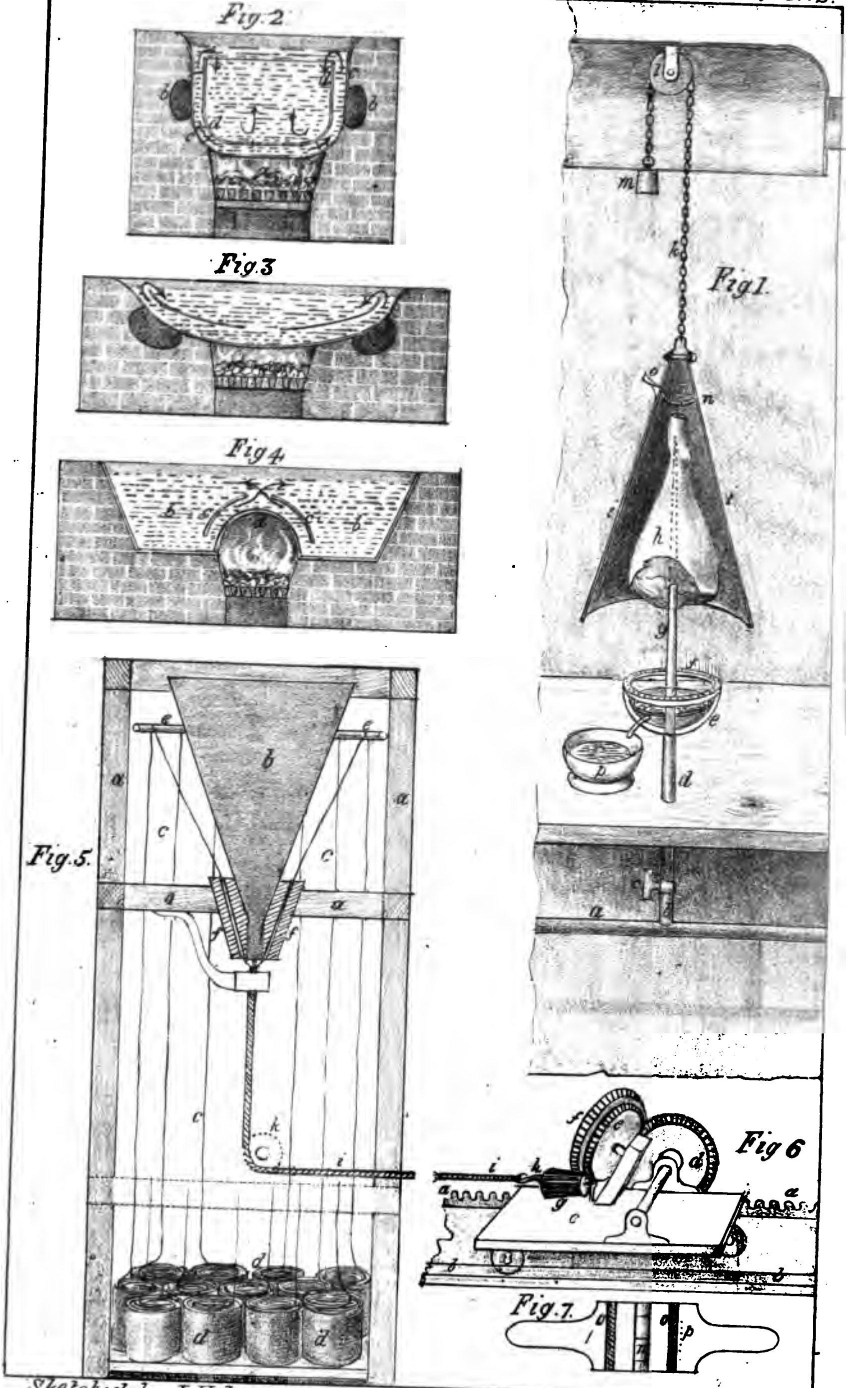
F. Lake. Lithog.

1. Mar. 1832



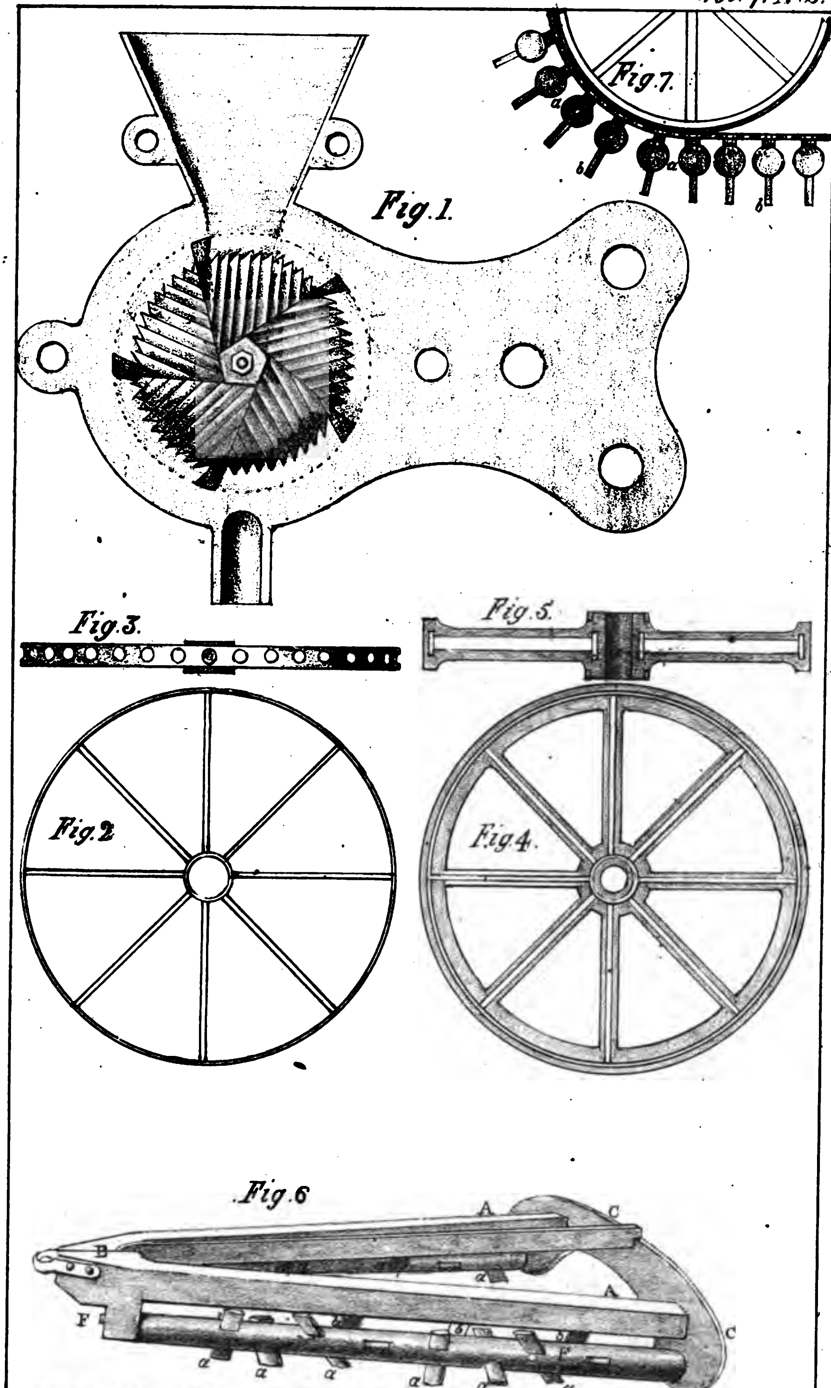
Sketched by L. Hebert E. Lake Lithog. 1 Mar. 1832

Plate. 5. Vol. 7. N.S.



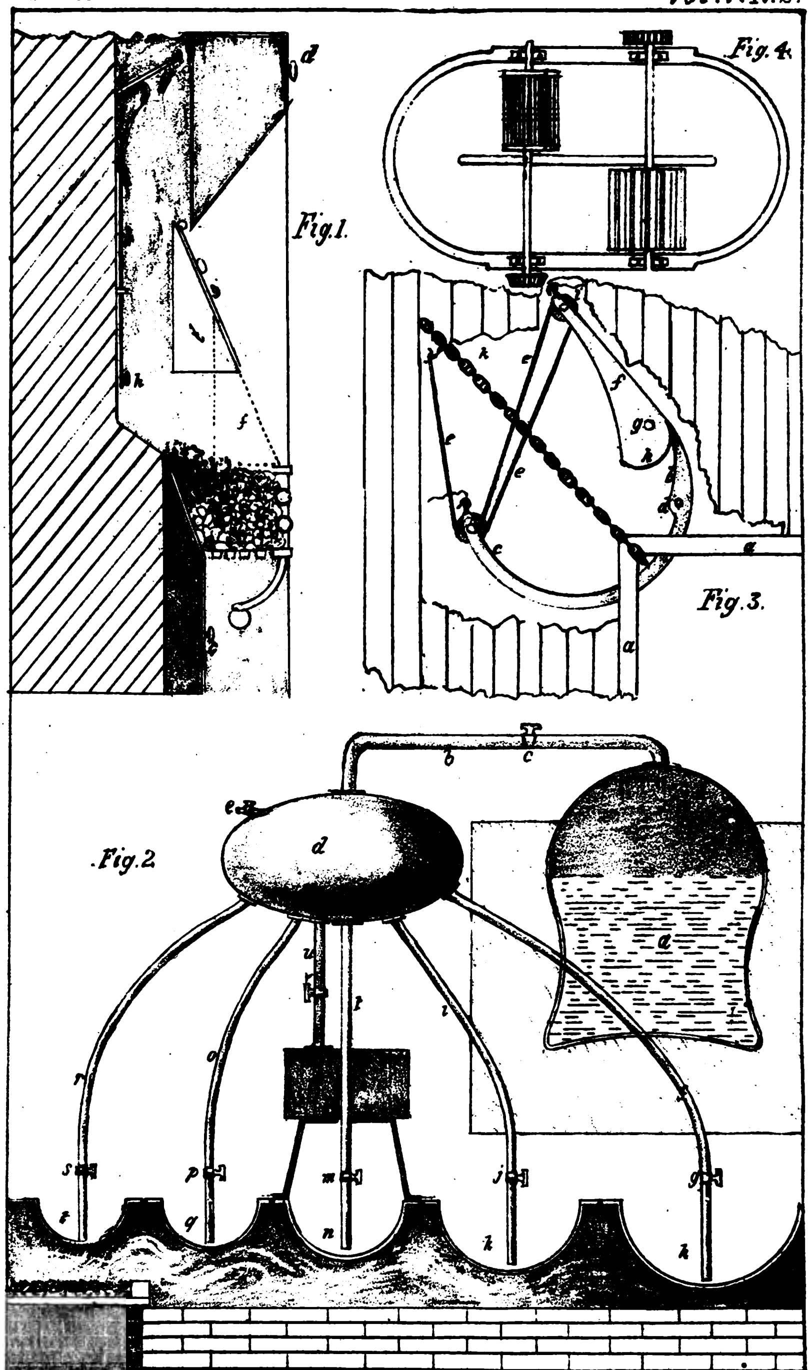
Sketched by L. Hebert

1. April. 1832



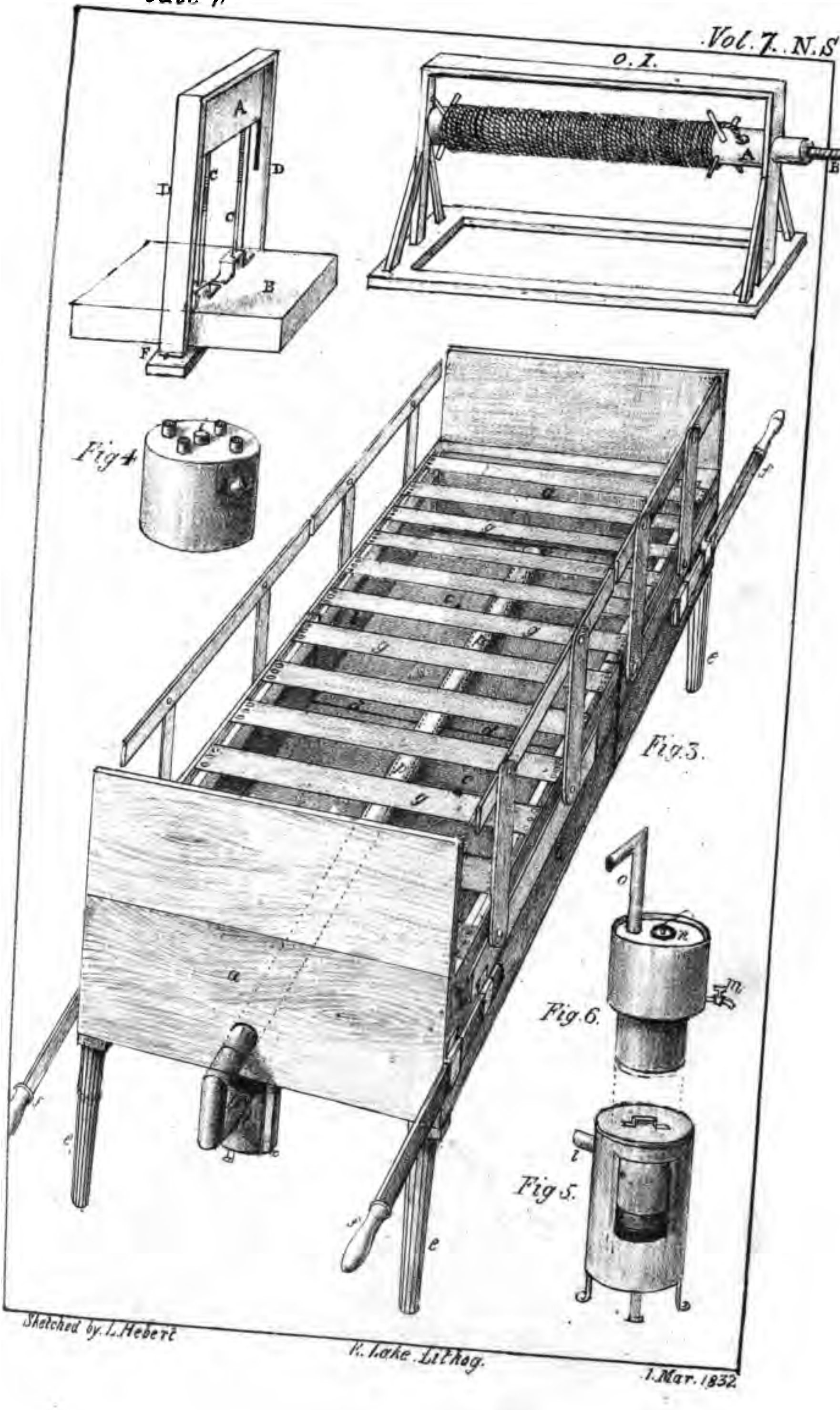
Sketched by L. Hebert

1 April. 1832



Sketched by L. Hebert F. Lake. Lithog. 1. Mar. 1832

Plate 4

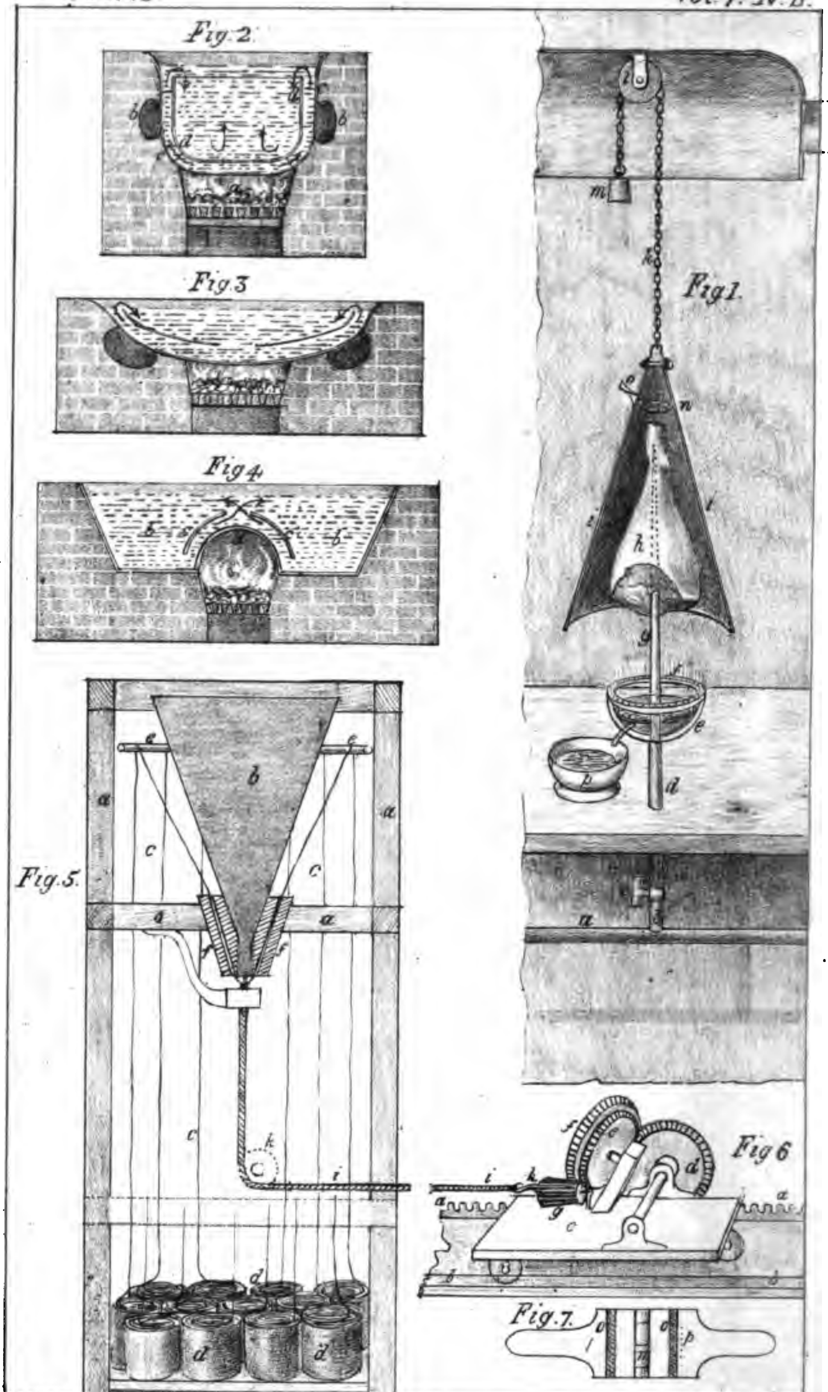


Sketched by L. Hebert

R. Lake Lithog.

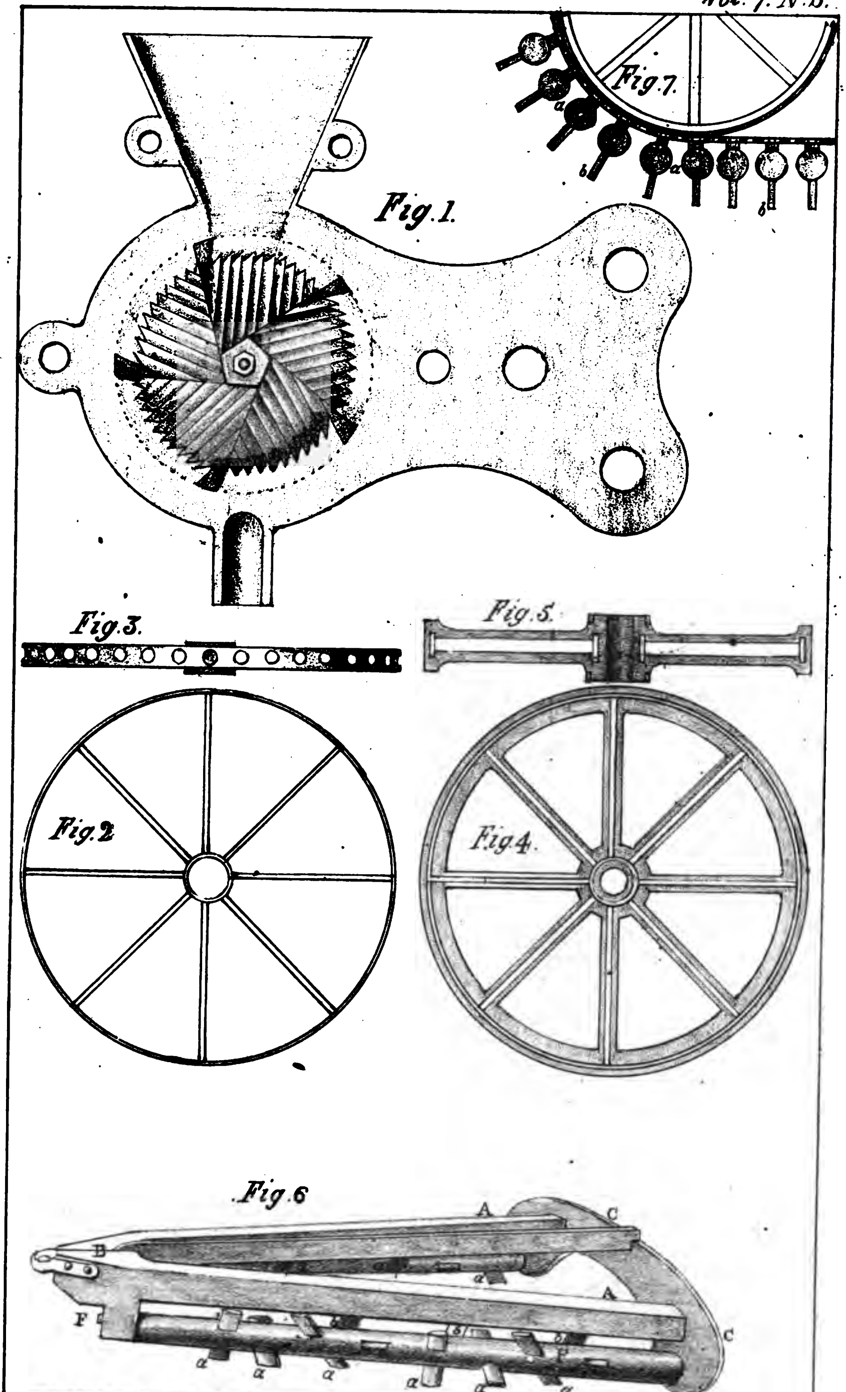
1 Mar. 1832

Plate 5. Vol. 7. N. S.



Sketched by L. Hebert 1. April. 1832

Plate. 6. Vol. 7. N.S.



Sketched by L. Hebert 1 April. 1832

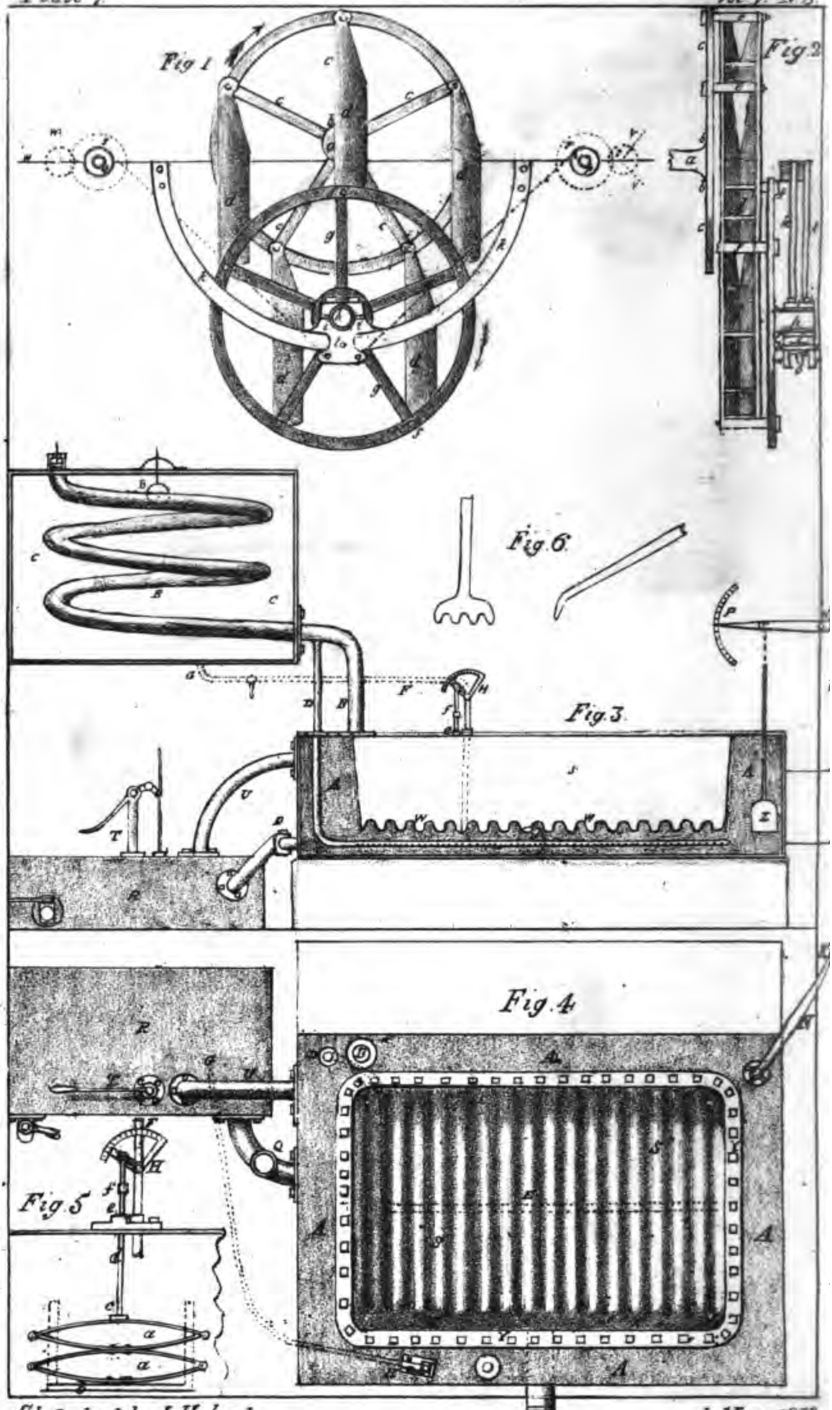
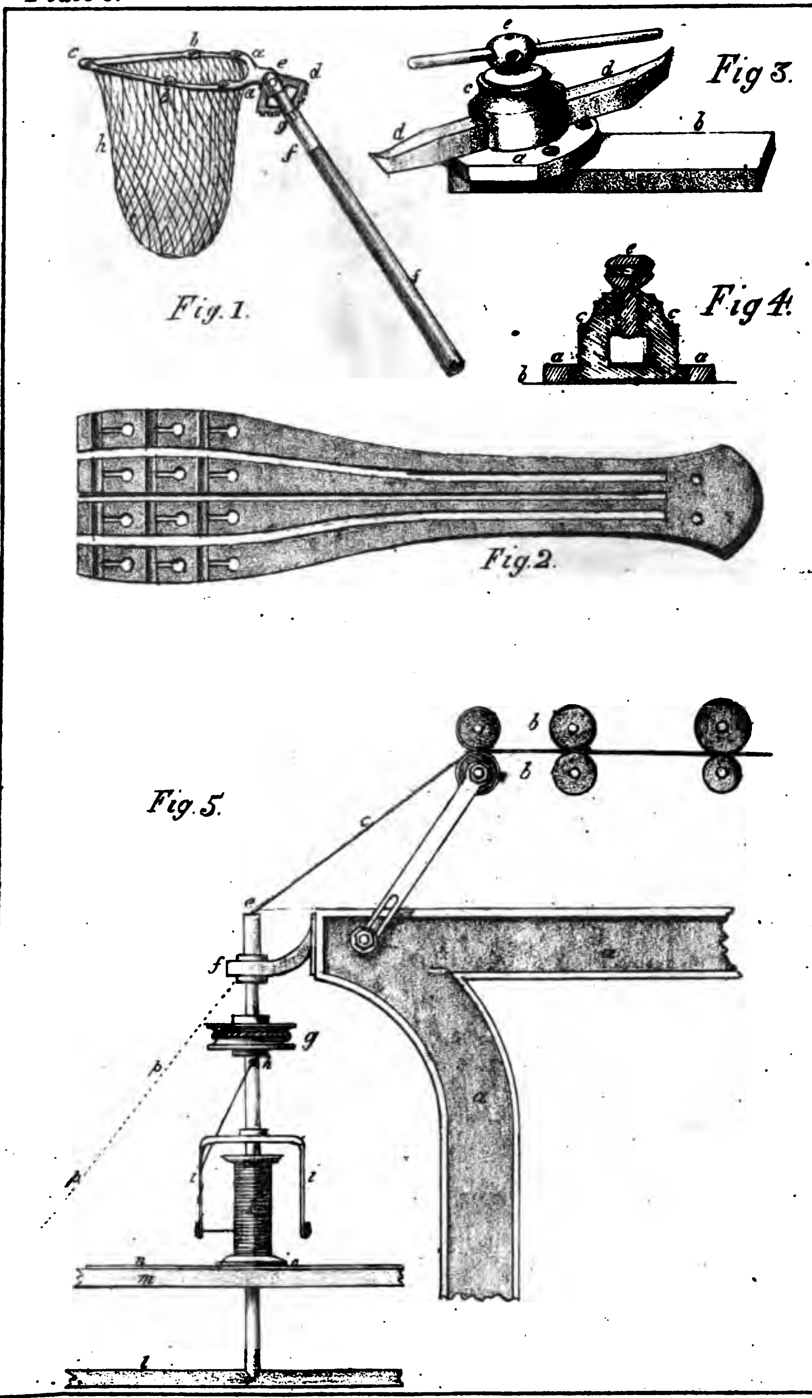


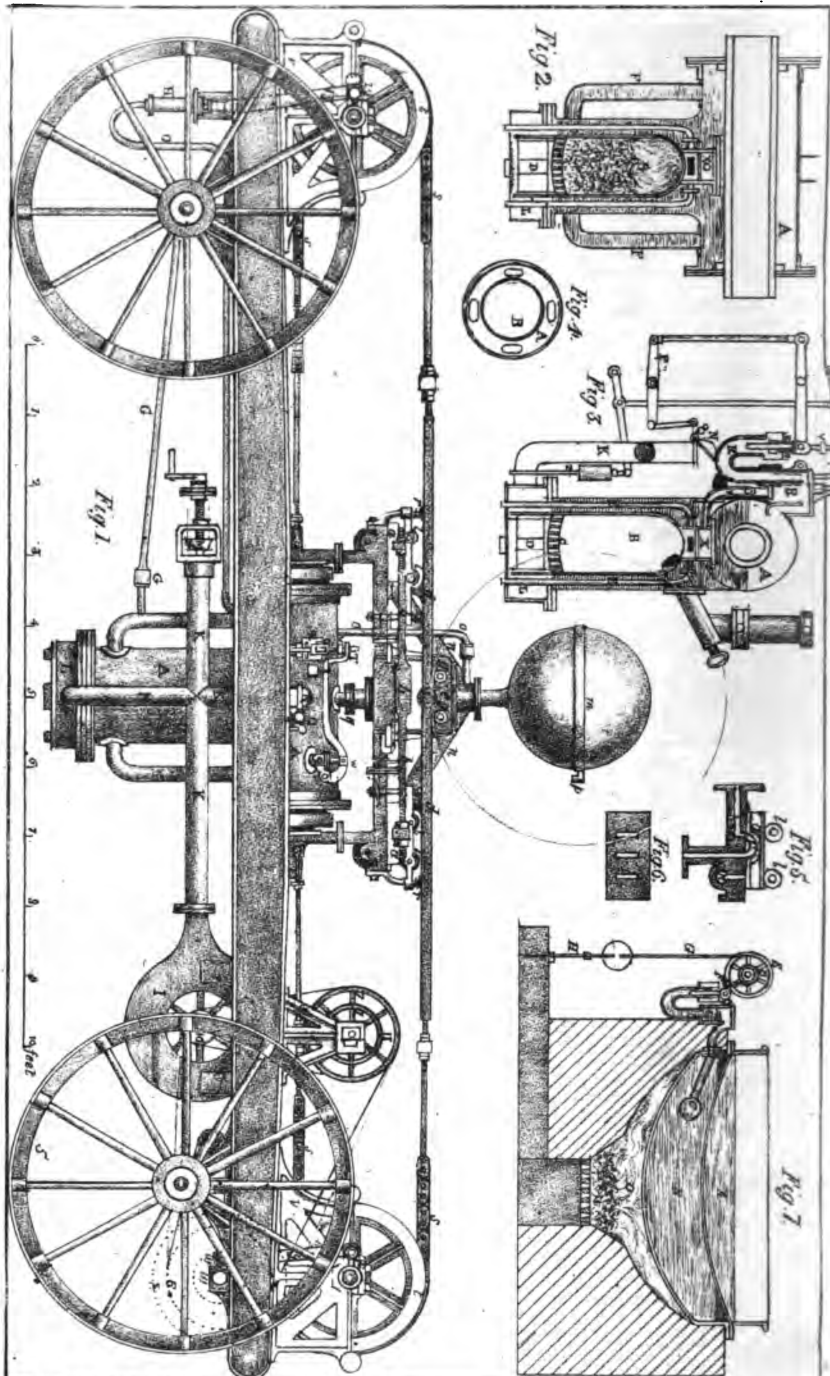
Fig 1
Fig 2
Fig 6
Fig 3
Fig 4
Fig 5



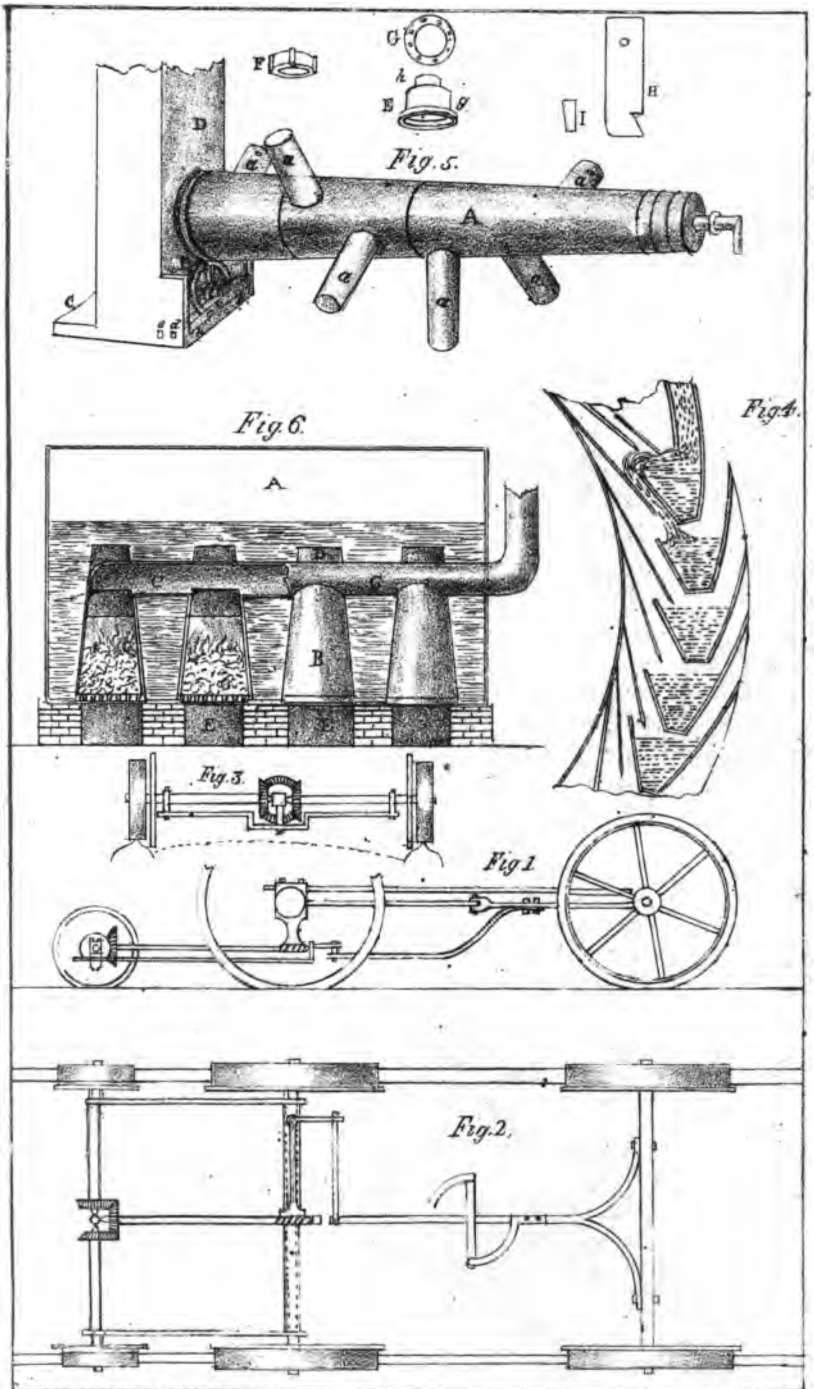
Sketched by L. Hebert

1 May 1832

Plate 9. *Vol. 7..N.S.*

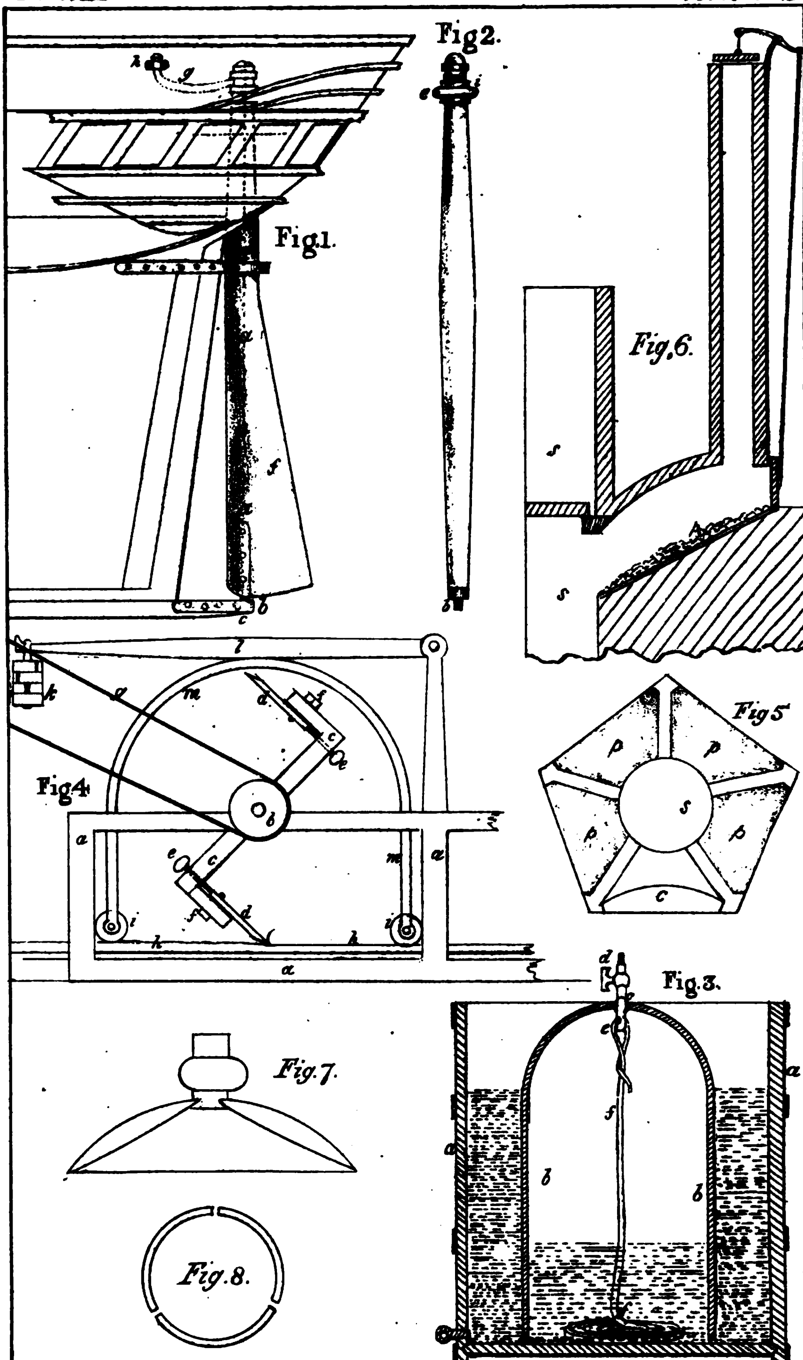


Sketched by L. Hebert 1 June 1852

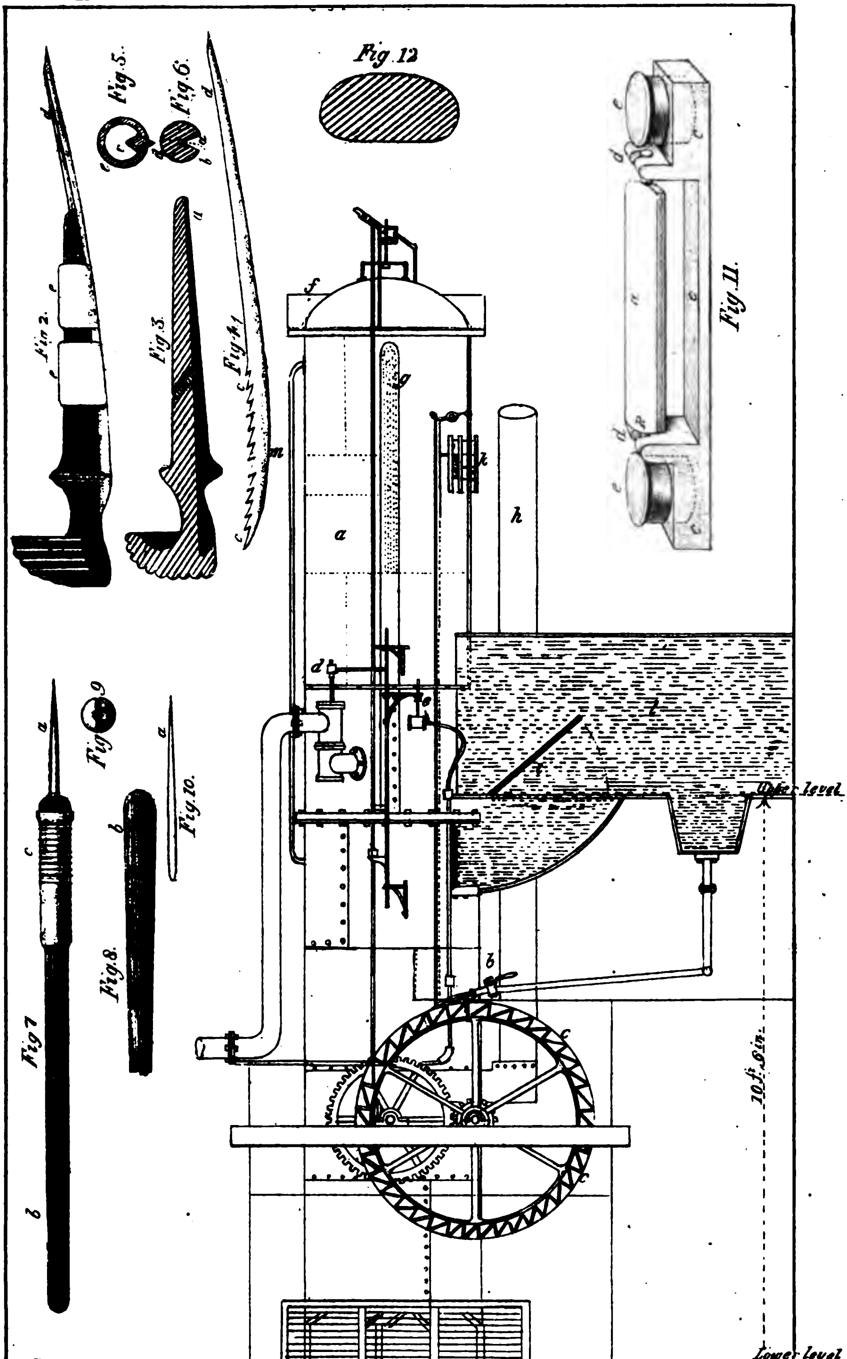


Sketched by L. Hebert

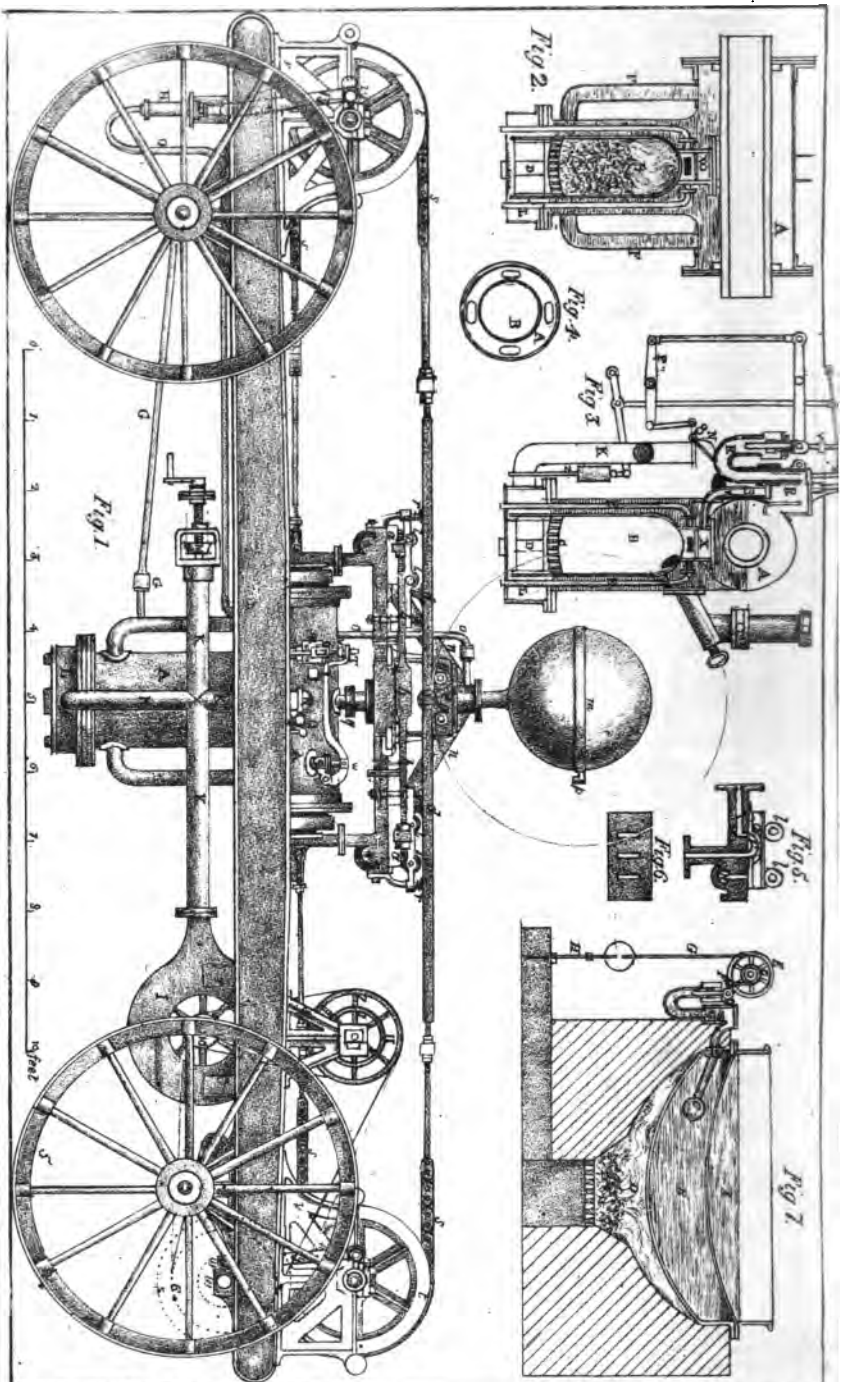
1 June 1832



Sketched on Stone by L. Hebert 1 July 1832

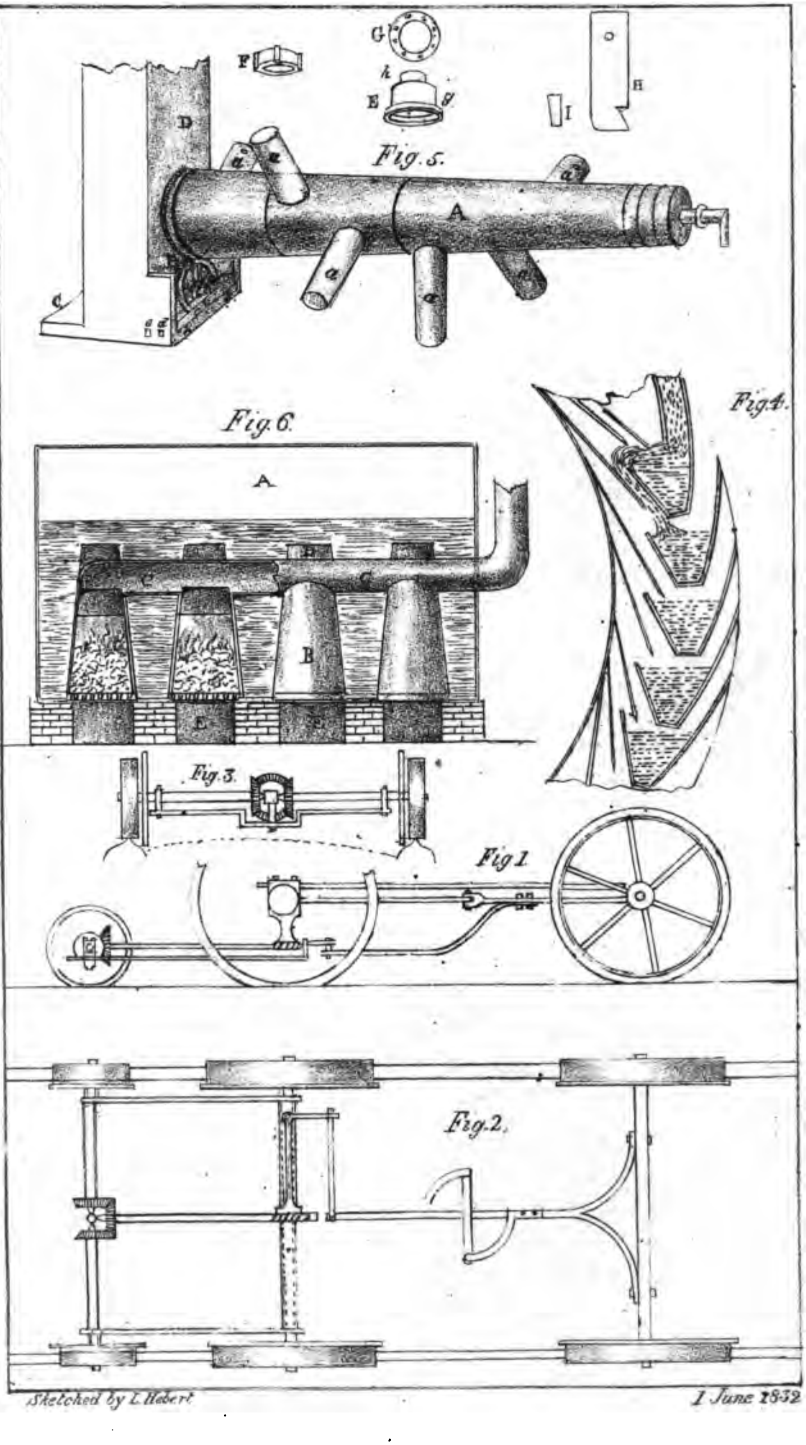


Sketched on Stone by L. Hebert *1 July 1832*



Sketched by L. Hebert

1 June 1862



Sketched by L. Hebert 1 June 1832

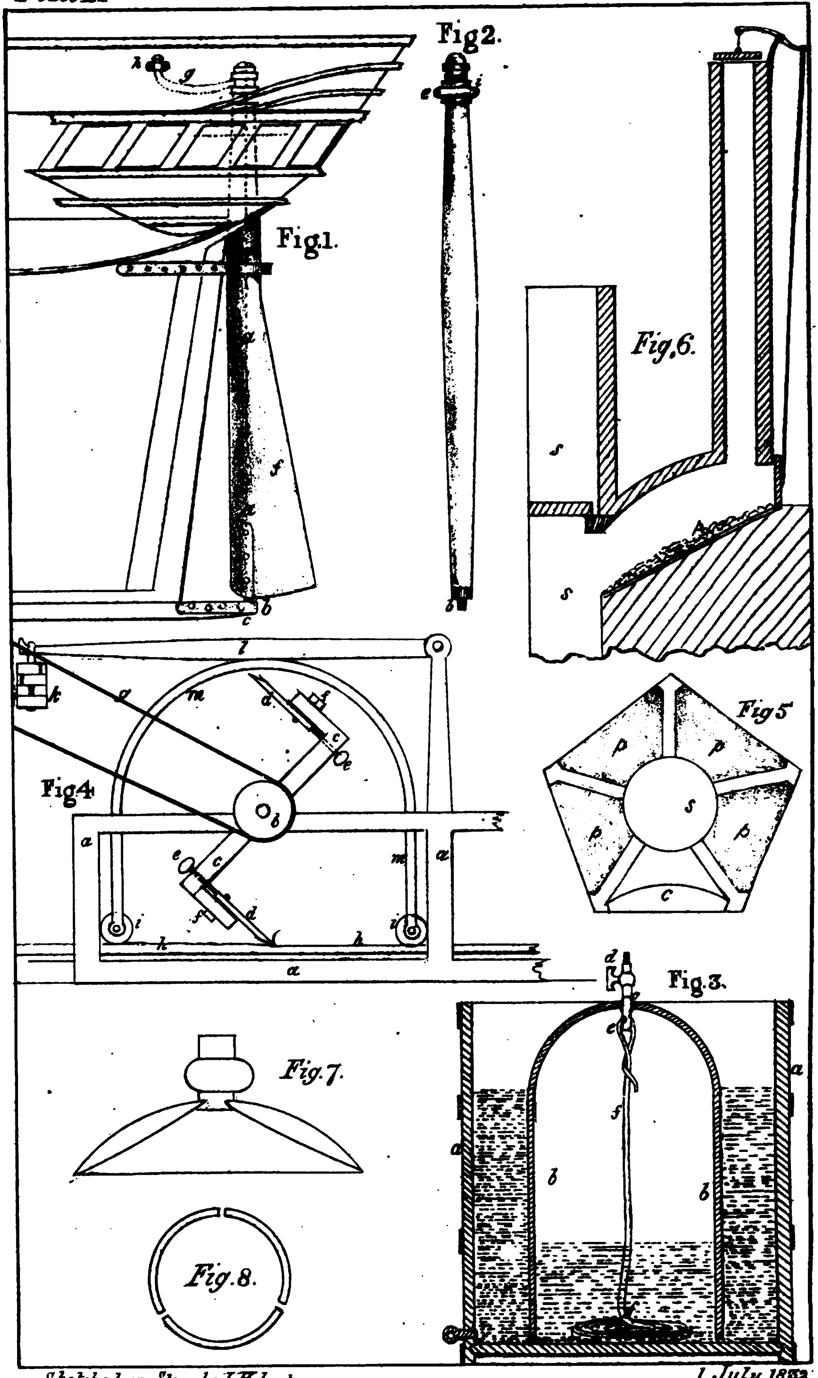
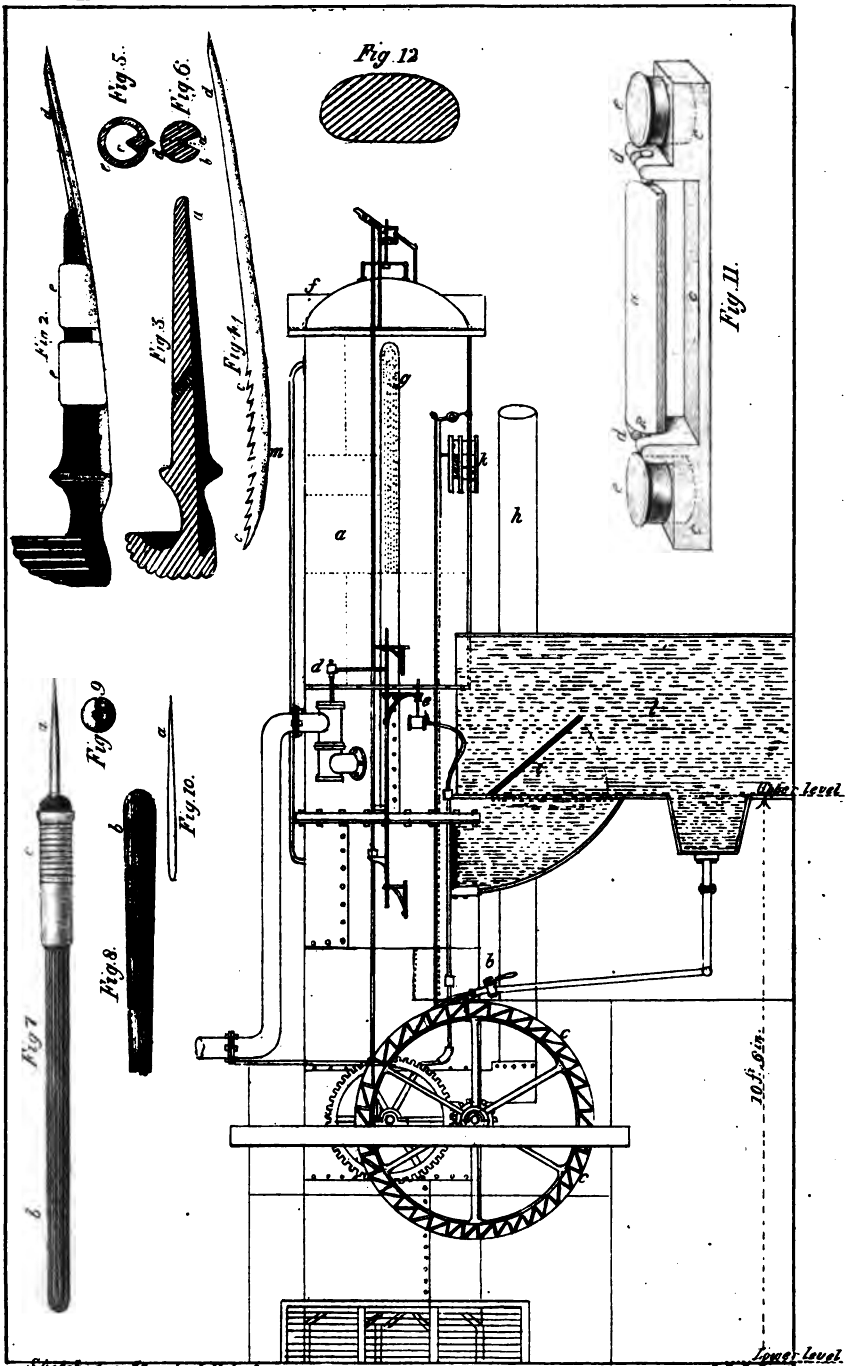


Fig 2.
Fig 1.
Fig 6.
Fig 5
Fig 4
Fig 3.
Fig 7.
Fig 8.



Sketched on Stone by L. Hebert
1 July 1832

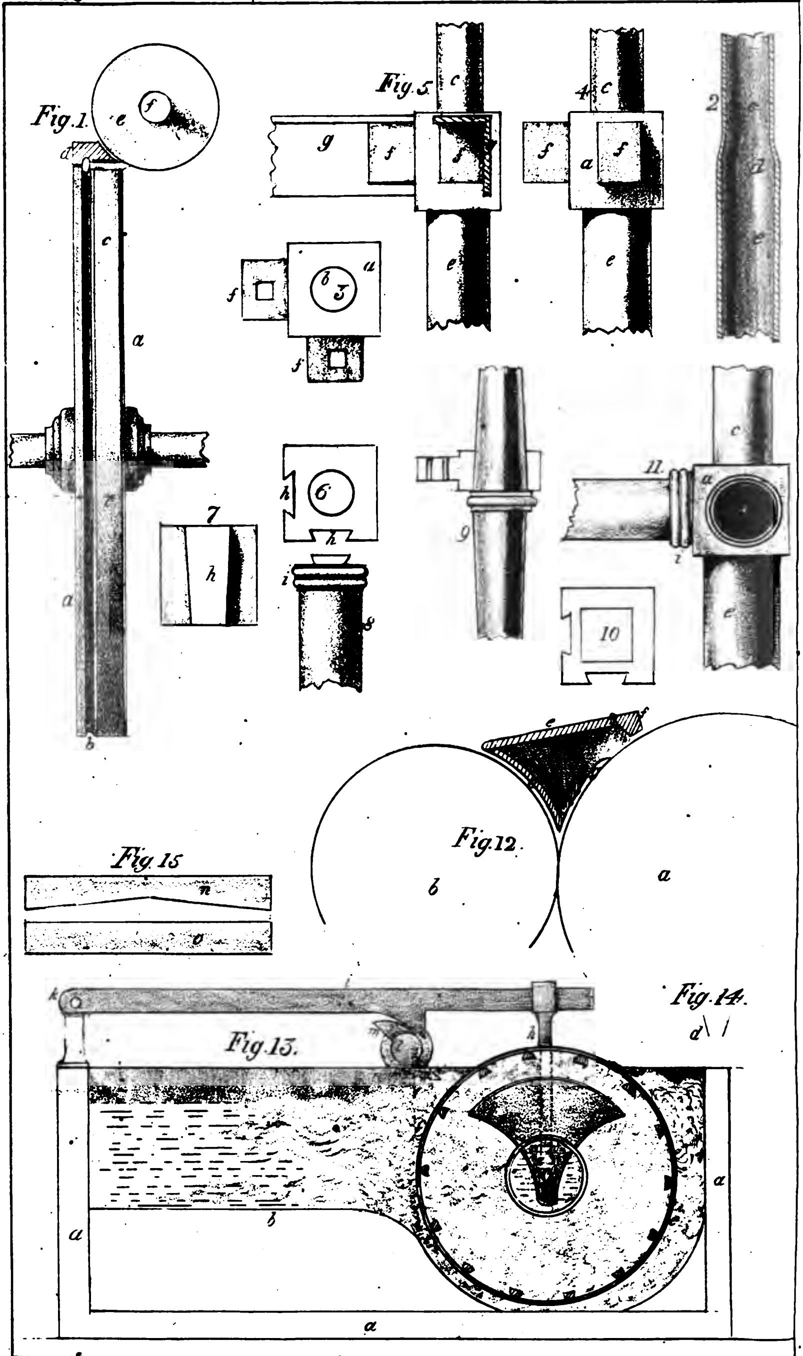


Fig. 1.
Fig. 5.
Fig. 12.
Fig. 15
Fig. 13.
Fig. 14.

Fig. 1.

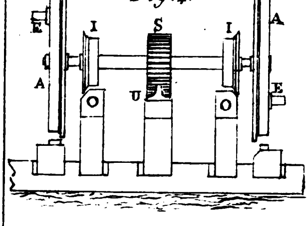


Fig. 4.

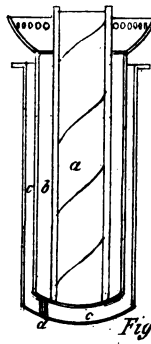
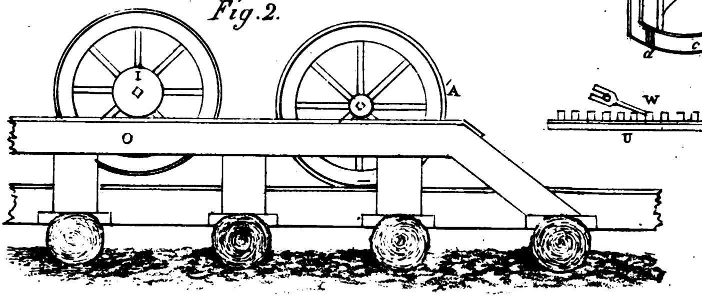


Fig. 3.

Fig. 2.



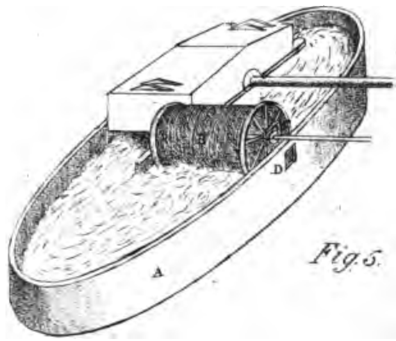


Fig. 5.

Fig. 8.

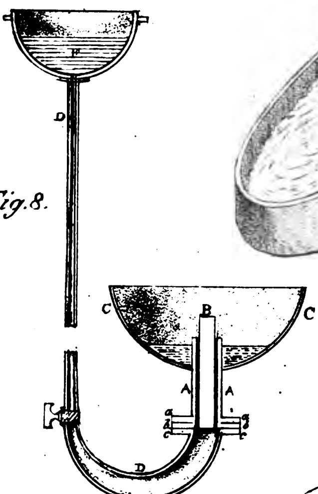


Fig. 7.

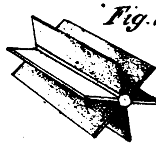
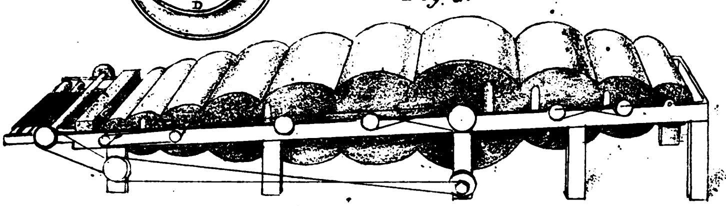
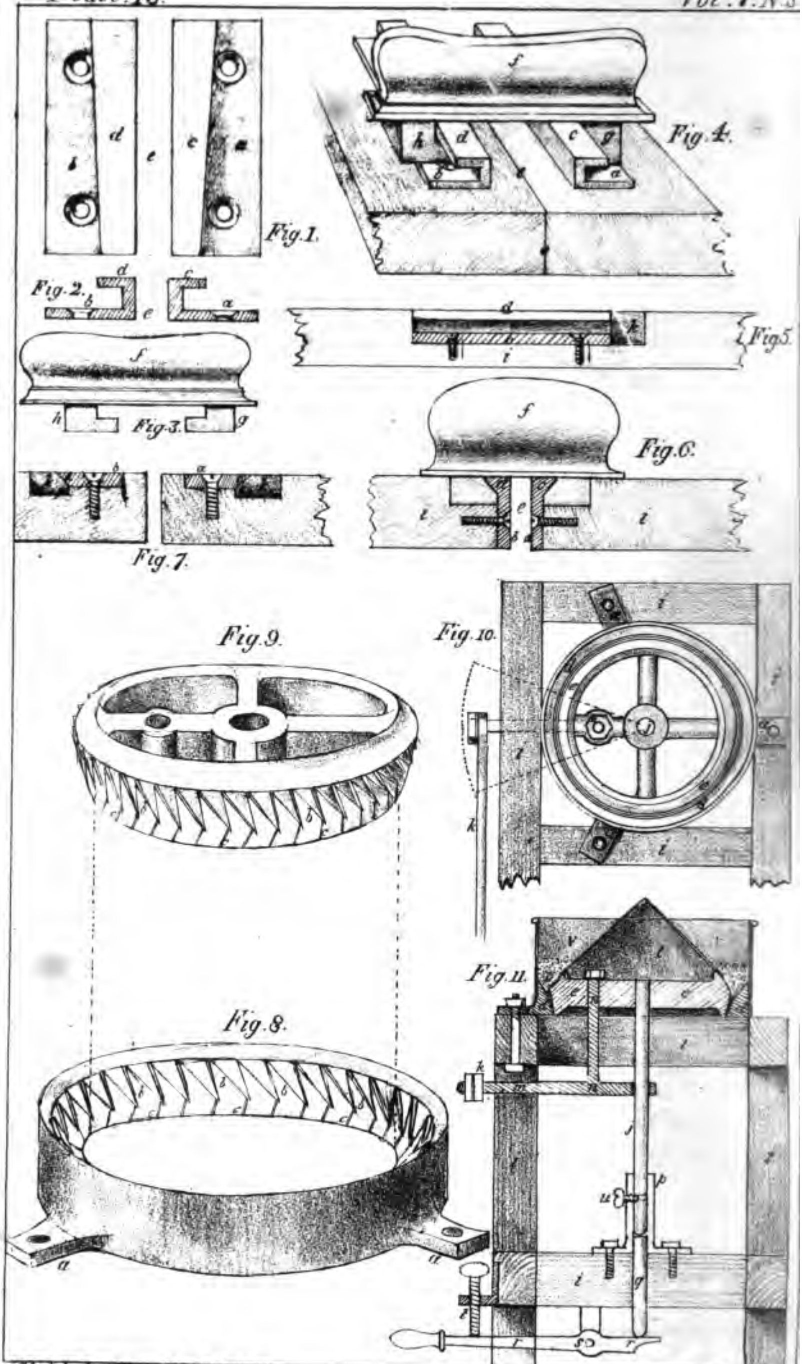


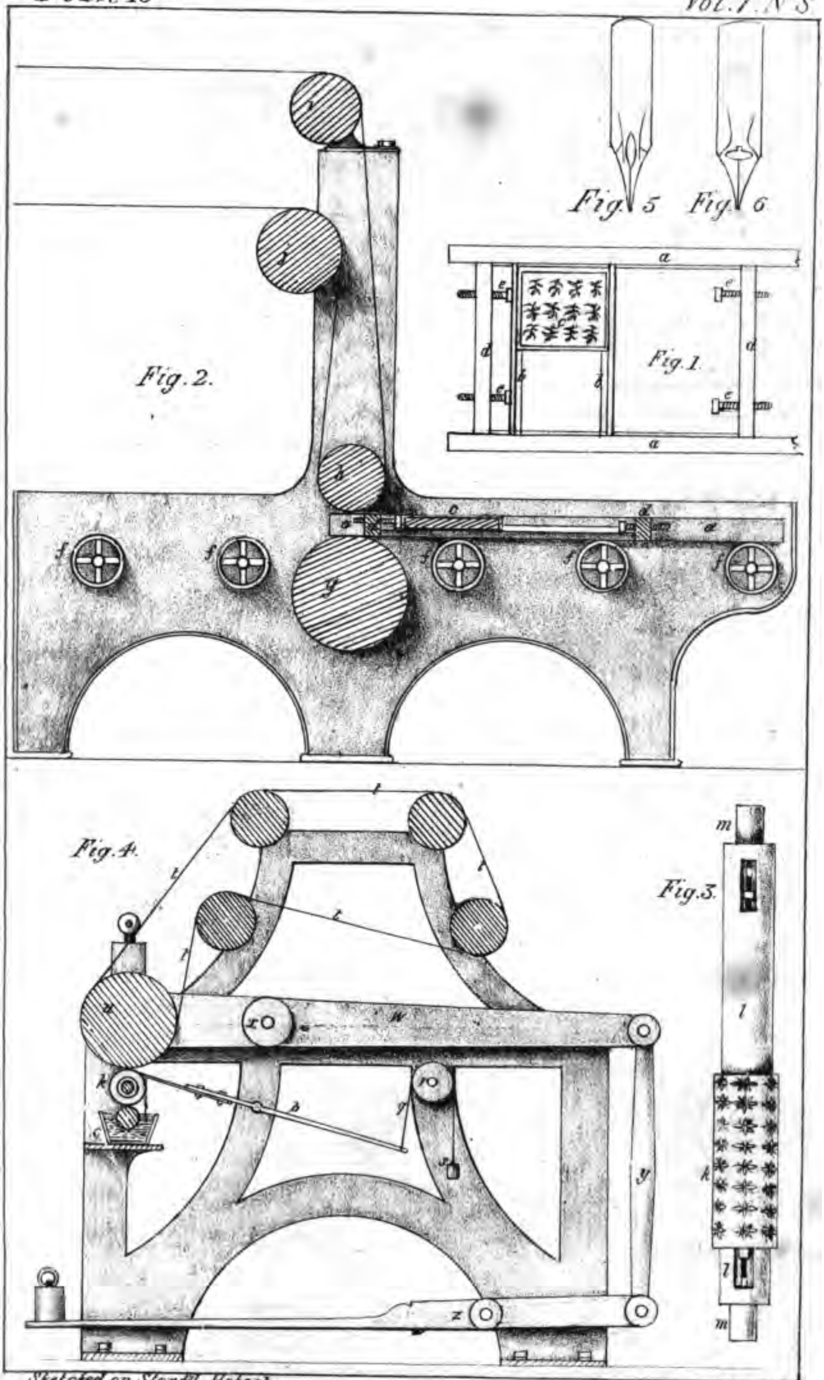
Fig. 6.





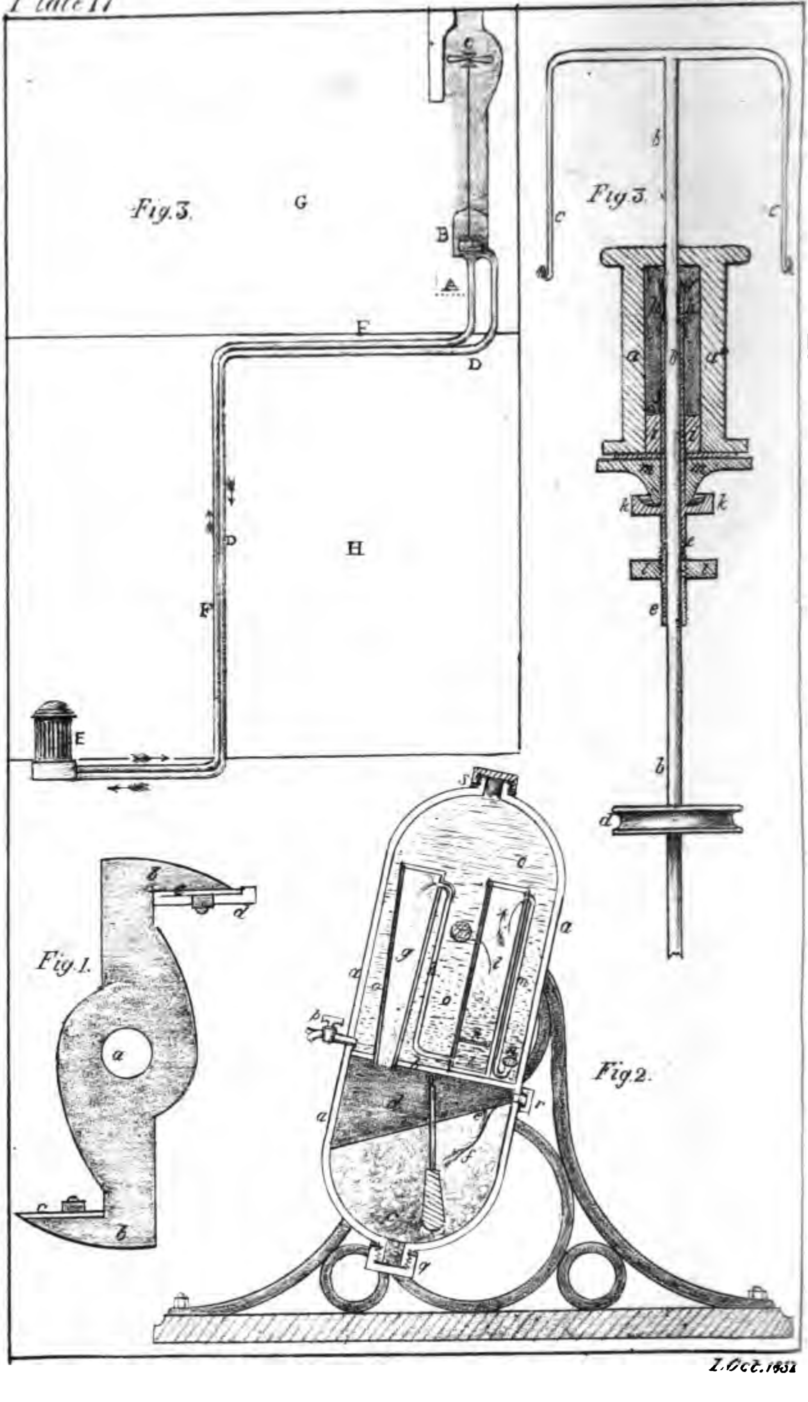
Skelchedon Stone by L. Hebert

1 Sep. 1852



Sketched on Stone L. Hebert

1 Sep. 1837.



1. Oct. 1851

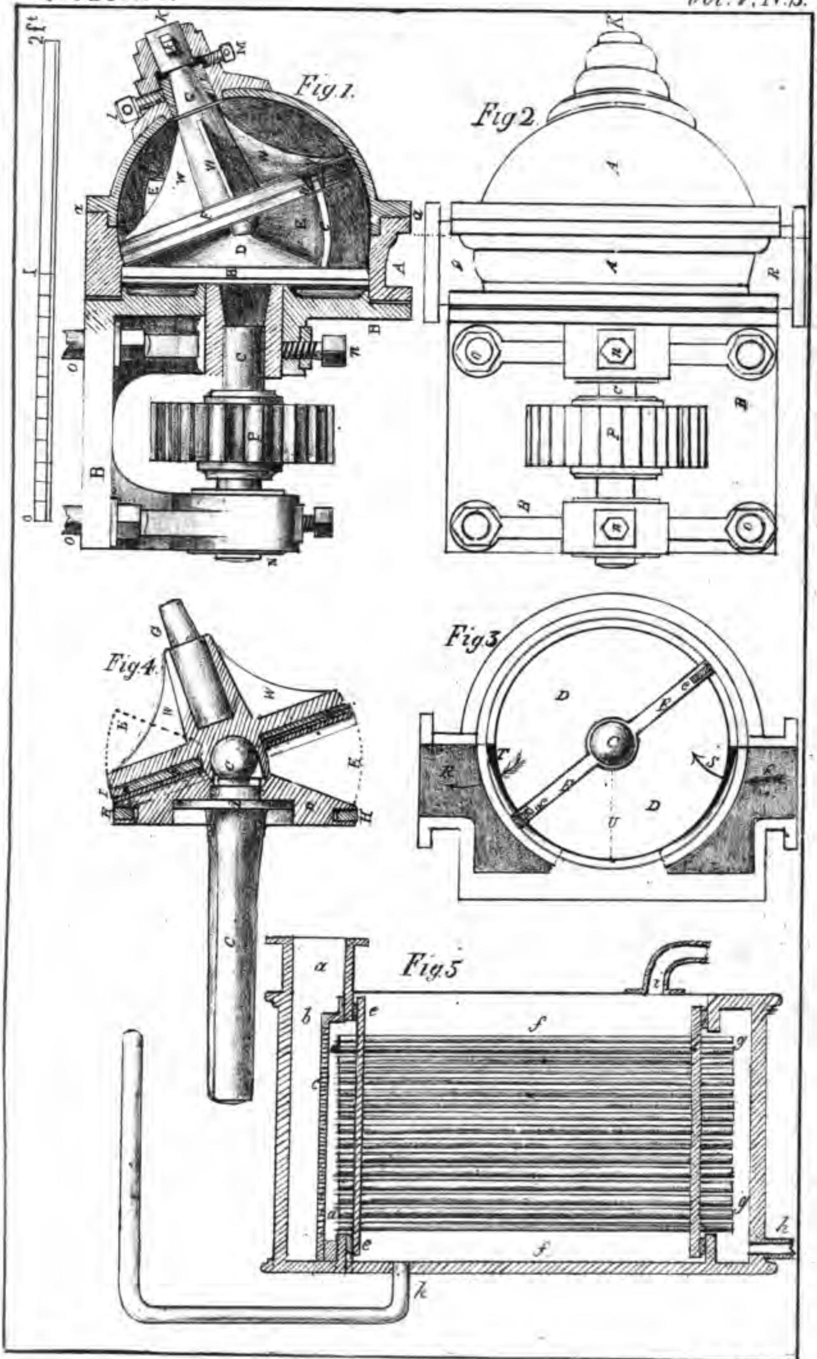


Fig.1.
Fig 2.
Fig 3.
Fig 4.
Fig 5.
2 ft
1
0

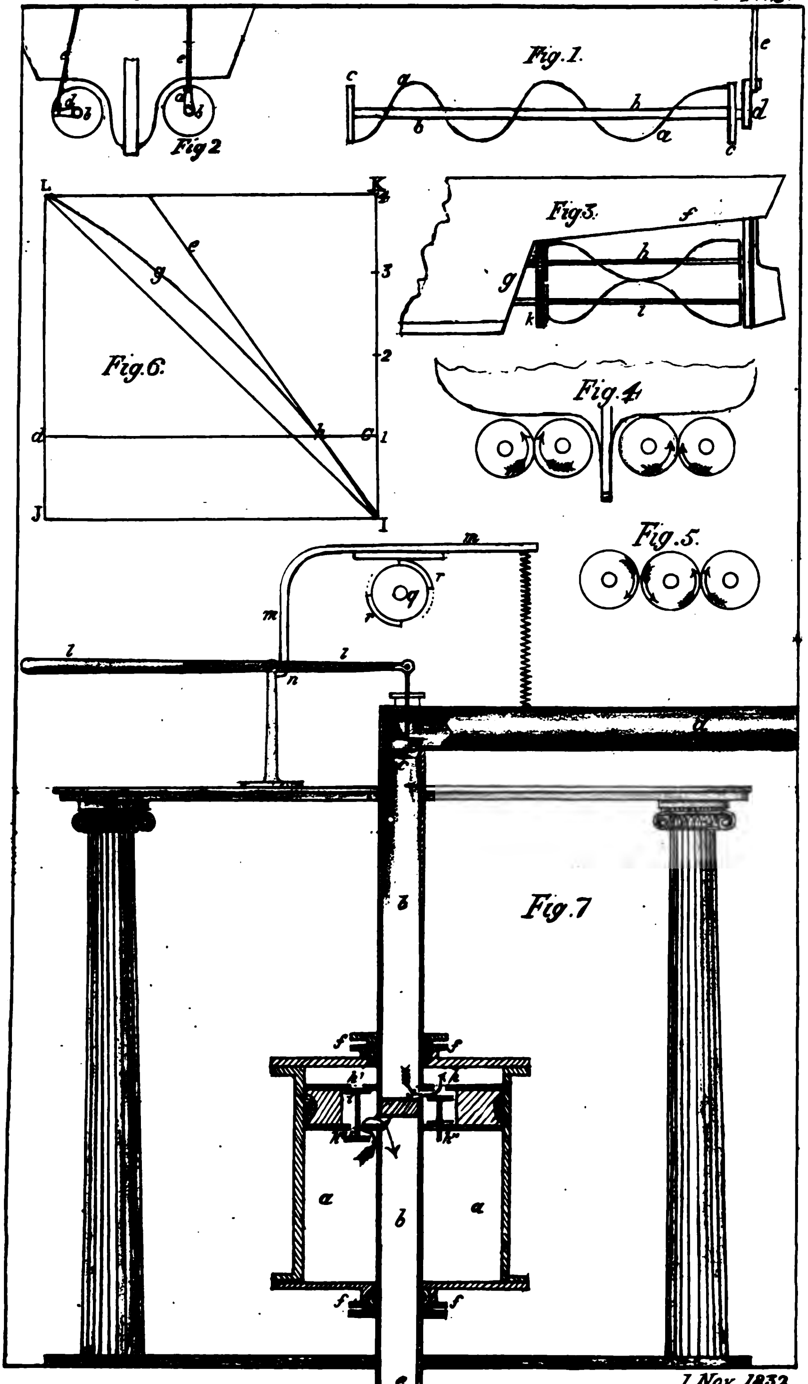


Fig. 1.
Fig 2
Fig 3.
Fig. 4
Fig. 5.
Fig. 6.
Fig. 7
L
K
J
I
d
G
h
e
g
1
2
3
4

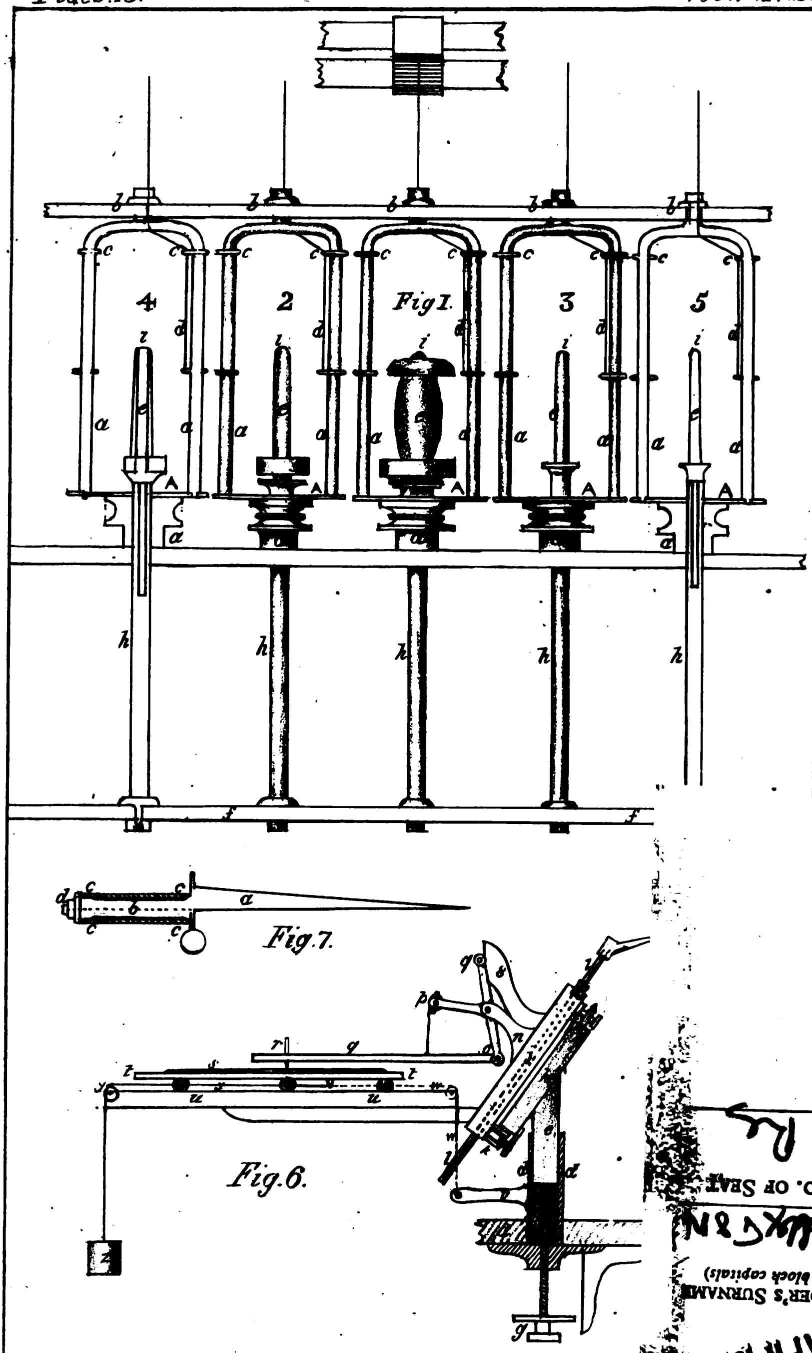


Fig.1.
4
2
3
5
Fig.7.
Fig.6.

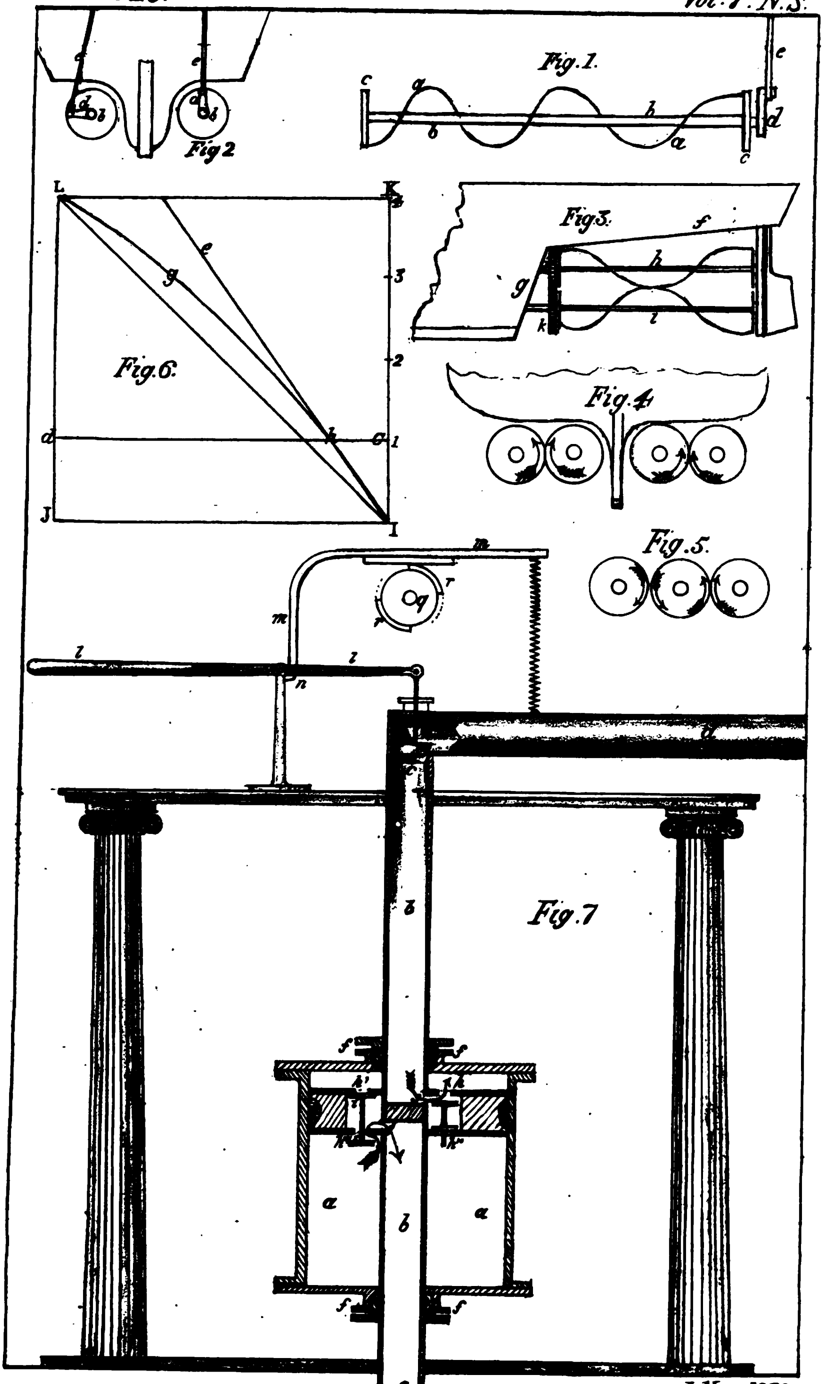
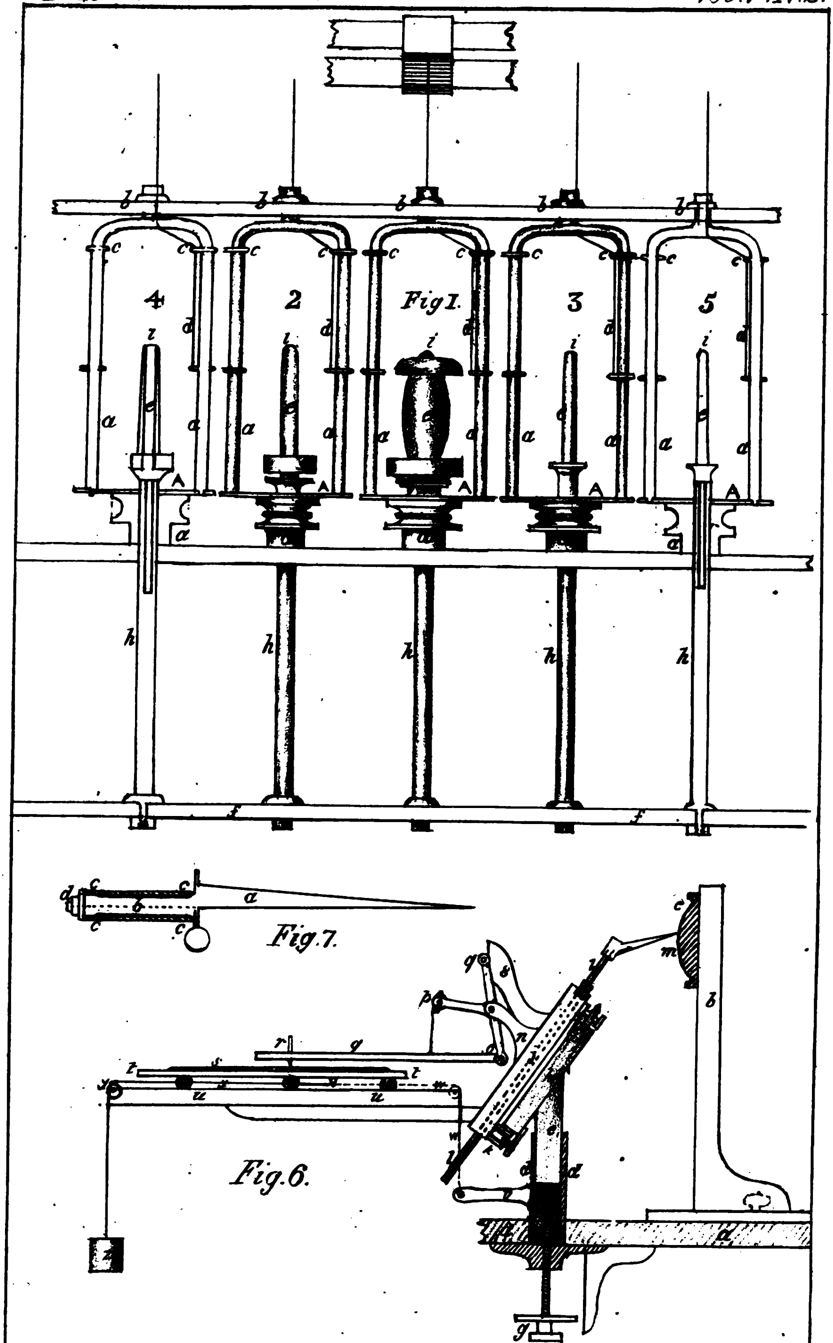


Fig. 1.
Fig 2
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7


4
2
Fig 1.
3
5
Fig. 7.
Fig. 6.